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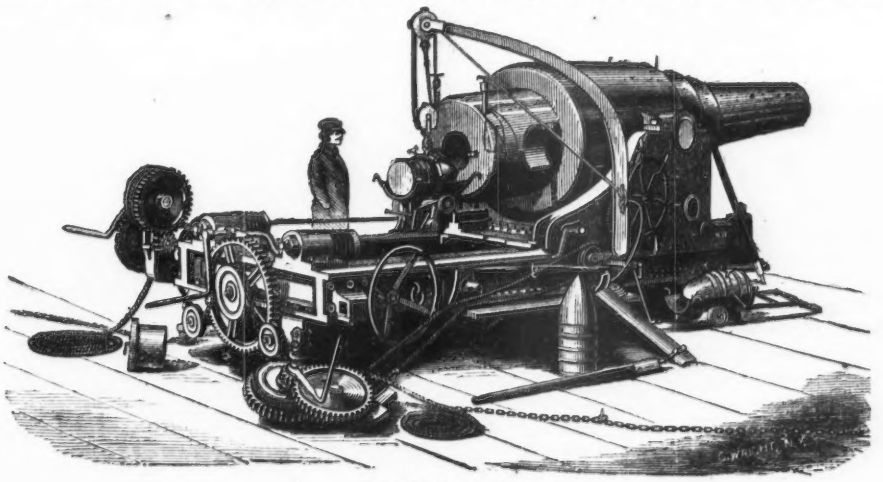
Krupp's Guns,

PROFESSOR EGLESTON'S paper upon the great KRUPP works at Essen, read before the American Institute of Mining Engineers and subsequently published in this Journal, as the organ of the Institute, has informed our readers of the extent and nature of that vast establishment, and the peculiar advantage which it possesses, in the ability to produce and to handle the largest known ingots of homogeneous cast steel. Among the most important purposes to which this product is applied, is the manufacture of steel guns of heavy caliber. These guns embody the modern principles of building up the body with an outer and an inner tube, rifling the bore, and loading at the breech. Every one of these principles has been tested separately in different experimental forms of artillery; but the KRUPP guns, combining them all with the advantage of a superior and perfectly uniform material, have proved the best. The comparative failure of the English ARMSTRONG system has thrown some discredit on breech-loading artillery in general; but without due foundation in reason, since the Armstrong is undoubtedly defective on grounds not necessarily involved in breach-loading, but belonging specially to the devices which the inventor employed for that purpose.



KRUPP'S GUNS.

Our illustration shows the 11-inch Krupp gun on a low self-acting casemate carriage. One of these guns at the works is recorded to have fired 600 charges. The weight of the gun is 55,000 lbs., of the projectile, 495 lbs., of the charge of powder, 83 lbs.; and the impact force is 74-70 foot tons for each square inch of section of the projectile. The largest Krupp guns used at the siege of Paris were twenty-four pounders, or as they are now called, fifteen centimetres (about six inches). The weight of this gun is about six thousand pounds; charge of powder, four and a half to five and a half pounds: weight of projectile, fifty-five to sixty pounds. The French forts were armed with the largest marine guns of the French fleet, but the accuracy of the twenty-four pounders soon dismounted them, piercing the casemates and reducing Fort d'Issy to a heap of ruins. During the entire siege operations, as well as in the artillery fights, the loss of the Germans was insignificant.

These works have supplied steel guns to various countries, as follows: 6 to 8 inch calibre, 600; 8 to 9, 700; 9 to 10, 400; 11, 150; 12, 6; 14, 2; Total, 1,858.

Captain O. E. MICHAELIS, of the U. S. Ordnance corps, has recently published a translation of the report of Capain NICAISE of the Belgian artillery service, on Field Artillery, and urges in an appendix the views it advocates. There is doubtless something to be said still for our heavy calibre; but it seems likely that the field artillery will have to yield before long to the demonstrated superiority of steel-rifled breech-loaders. At all events, we cannot but join with the *Army and Navy Journal* in expressing the hope that the United States Government will make a trial of Krupp's light 3 or 3½ inch guns, in competition with our own 12-pounder and 3 inch rifle. That no Krupp gun has ever been experimented with in this country, though all Europe is ringing with the echoes of their trials and triumphs, is not creditable to us as a progressive military nation.

Polytechnic Association of the American Institute.

Meeting held May 10, 1872, President TILLMAN in the chair.

A paper on Meteorology was read by Prof. OWEN W MORRIS. An abstract of its contents will be found in our Department of Popular Science. After the reading, the following interesting discussion ensued:

The PRESIDENT.—The gentleman has alluded to the predictions with regard to the weather, by the Signal Service of the War Department, under Gen. MYER. There has long been a doubt on the part of a great many people whether the barometer actually indicates anything with regard to the weather. I remember that at the Farmer's Club, SOLON ROBINSON managed to confuse the minds of people on this point, so much that many concluded not to buy barometers at all. But the results which have been reached by the Signal Service are sufficient to establish the value of the barometer. Meteorological observations have been going on in this country for many years under Prof. HENRY, of the Smithsonian Institution, who suggested that they should be made simultaneously at a large number of stations. The invention of the electric telegraph has given us the means of bringing to one point at the same time the news from all quarters of our country, of the indications of the barometer, the thermometer, the direction and force of the wind, etc.; and thus the officers at Washington are able to predict with considerable certainty what the weather will be in any part of the country for the following 24 or 48 hours.

This experiment was tried in England; but it was there a failure. The whole of England embracing a territory but little larger than one of our larger States, they have not there the range which enables us to arrive at the motions of the storms, and the times at which they will arrive at any particular point. The predictions which are daily published in our newspapers, have been verified to about 75 per cent; that is, three-fourths of all the predictions which they have made have been found to be true.

This is of immense importance, in a great many points of view. It is very important in the summer for the farmer to know, after he has cut his grass or his grain, whether it is safe to let it lie on the ground. Sometimes the religious question comes up whether he shall gather his crops on Sunday. Now we have reached a point, where he can decide the question in advance, whether there will be occasion for it. If the news comes to him on Saturday, that the probability is that there will be no rain to-morrow, he can let it remain and need not gather it on Saturday. Or if rain is predicted, he can take it in on Saturday, and avoid the injury to his crop, without entrenching upon the Sabbath. I regard this as the greatest advance which we have made within twenty-five years. It makes but little difference to us who is President, or at the head of the Supreme Court; but it is a great advance when we arrive at a point of certainty with regard to our knowledge of any scientific subject, where what we learn is not liable to change. Meteorology is now becoming a certain science. The predictions are still liable to some errors, but they are sufficiently accurate to demand attention; and I have no doubt that the public will, from the benefits they have derived from the predictions already made, demand that appropriations shall be made by Congress not only to continue the system but extend it.

Prof. MORRIS has given us very interesting statements with regard to the mean temperature of New York for a series of years. There is a liability to some inaccuracy in these results, as you will readily see. When these observations were instituted, the Smithsonian Institution was not provided with the proper instruments for taking complete series of observations, and Prof. HENRY therefore directed that the observations should be made three times in each 24 hours, at 7 o'clock in the morning, at 2 o'clock in the afternoon, and at 9 o'clock in the evening, for instance. Now it might turn out that for a whole year the thermometer might stand highest at 4

o'clock in the afternoon, or that either the barometer or the thermometer might vary at the selected hours from its usual position in comparison with the remaining hours of the day. We cannot therefore be as certain with regard to our results as we might be if we could have the record extending through the whole 24 hours. The means of obtaining this record are now within our reach. By the Printing Barometer of Prof. HOUGH, of the Dudley Observatory, the record is printed every five minutes, automatically, of the height of the barometer to the nearest thousandth of an inch. Such an instrument ought to be at every observatory in the country; and it ought to be employed by the government in its meteorological observations. The same principle is applicable to the thermometer, the rain gauge, or other instruments, so that a complete record can be printed of the indications of each, all on one piece of paper, placed on a cylinder which revolves once in 24 hours. When you have 365 of these records, you have a volume containing the complete record of the year. Congress ought to make an appropriation to provide these instruments at every observatory throughout the United States.

The thanks of the Association were tendered to Prof. MORRIS for his papar.

Mr. J. K. FISHER wished the principle to be carried still further; not only to have the printed record, but to have a diagram marking the indications by a continuous line, giving them at every moment of the day. Sometimes the thermometer will change 20 deg. within an hour. There ought also to be a recording apparatus, contrived like the register of gas consumed, to sum up the results, so as to give the mean at any desired time with accuracy.

Dr. L. BRADLEY called attention to the records now kept at the Central Park by Mr. DRAPER, by self recording apparatus of his own invention.

Mr. W. E. PARTRIDGE said that in observing the thermometer, one important point had been neglected; to record the temperature in the sun, that to which we are subjected when we walk the streets. He had seen the thermometer run up to 146 deg. in the sun, without a blackened bulb, and without any radiation from brick walls.

Prof. MORRIS.—I have a thermometer with a blackened bulb. To-day it was up to 116 deg. in the sun. Last year the highest point was 122 deg. Either the apparatus of Prof. HOUGH or of Prof. DRAPER will give us a continuous record from one end of the year to the other, of the barometer, the thermometer, the rain gauge, the humidity of the atmosphere, etc., so that if the means are furnished to procure the apparatus, costing about $500, the records can be made. I have kept a record for the Smithsonian Institution for many years, three times a day. At first the hours were 6, 2, and 10; but afterwards the morning hour was changed to 7 o'clock. The thermometer is generally higher at 3 P. M. than at 2 P. M. on warm days. Observations are taken at the same hours, local time, not only all over this country, but in England, France and Germany.

The PRESIDENT.—Prof. ESPY and Prof. REDFIELD are the two men to whom the world owes most on the subject of Meteorology. Prof. ESPY was the first to show that storms moved in cyclones, and in certain directions; and Prof. REDFIED also made very important discoveries. The subject of meteorology is one that affects every one. For instance, within the last ten years I have lost three or four umbrellas. (Laughter.) But now, in the morning I take up the paper, and if it says there will probably be no rain within the next 24 hours, I leave the umbrella at home- It is true that I have occasionally trusted to my wife, who insisted that it was going to rain, in spite of the weather prediction to the contrary; and in that way my umbrella has been brought with me, and has been forgotten and left, having no use for it, and lost. (Laughter.) Meteorology concerns every man; and not merely the farmer, or the commercial community to whom it is of the highest importance. Adjourned.

The Investigation of Boiler Explosions.

[A Letter from Judge Bradley, of the Supreme Court of the United States.

WASHINGTON, April 15, 1872.

Hon. GEORGE S. BOUTWELL, Sec. of the Treasury:

SIR:—For the purpose of promoting the object of a large number of engineers and others interested in steam transportation, who desire that Congress should authorize experiments to be made to ascertain, with greater certainty, the cause of explosions and the best means of preventing them, and at the instance of persons speaking in their behalf, I have taken the liberty of addressing you the following letter. I hope that the intrinsic importance of the subject will be my excuse for troubling you with its perusal.

After the lapse of more than fifty years the subject of explosions of steam boilers has lost none of its interest or importance. They recur as frequently as ever, and are attended with frightful results to persons and property. Legislation has hitherto wholly failed to correct the evil. The cause of this failure has been the ignorance which has existed (and which still exists) with regard to the precise causes by which explosions are produced. The want of proper experiments on real boilers has left the matter open to speculation; and the result is a wide diversity of opinion amongst even skillful engineers, as to the true cause of these disasters. With such a diversity of opinion, it is impossible to procure verdicts against those who are really guilty of negligence. In nearly all cases that have occurred since the passage of the first law in 1838, the guilty party has been shielded by the uncertainty and doubt that has prevailed as to the causes of the explosion. The notion has become prevalent that these accidents (as they are called) are the result of some mysterious cause—the production of an unknown gas, the combination of electrical and chemical forces, against which no foresight can guard. Such notions have a tendency to stop inquiry, as well as to relax the attention and watchfulness of engineers in charge. A series of experiments, conducted on a proper scale, and in a proper method, would undoubtedly tend to dispel such illusions, and to reveal the exact causes of explosion, against which it is necessary to guard. And whatever diversity of opinion exists among engineers as to these causes, it is believed that they are quite unanimous as to the necessity of direct proof by experiments on actual boilers on the following points: first the comparative strength of old and new boilers differently constructed, and of boilers constructed of different kinds of iron; and, secondly, the methods of relieving them of too great pressure.

But the experiments that are requisite for attaining these ends require too great an outlay of money to be maintained at private expense. They need, and should have the support of government, especially as the Government attempts (very properly) to regulate the subject.

Experiments on the causes of boiler explosions were made about thirty-five years ago by the Franklin Institute of Philadelphia, and a report was made to the Secretary of the Treasury who had furnished the funds. These experiments were made by a very able Board, of which Professor A. D. Bache, was chairman. The results obtained, and the deductions from them, constitute nearly all that is now known on the subject of explosions, and of the means of preventing them. This report has been published all over Europe, and forms the standard of reference. [See Report E, Doc. 162, 1st Sess., 24th Cong.] But these experiments were made upon model boilers of small dimensions, for the purpose of obtaining theoretical results, as to the behavior of the structure under certain preconceived conditions. The trial of real boilers and the careful examination of boilers actually burst, and especially the reconstruction and testing of them under various conditions was not attempted.

There have been as yet, in no country, any serious attempts made by trials and experiments on steam-boilers of the size and kind generally used, to find the laws governing explosions; or to find the means of preventing them. From their dangerous nature, such experiments cannot be made upon boilers in use; and the examination of the *debris* of an explosion generally adds nothing to our knowledge. The necessity of such experiments has been acknowledged in all countries where steam is employed; but the expense and difficulty of making them on actual boilers, have prevented their being made. From a few experiments made at Sandy Hook in November last, upon boilers of different ages, in the presence of a large number of engineers, it became perfectly apparent, that much is yet to be learned on the entire subject, and that intelligent and efficient legislation cannot be devised in reference to it until the investigation is prosecuted much farther than it has yet been. The probability is very great, that contrary to opinions frequently advanced, there are no forces acting in the explosions of steam-boilers, but such as can be controlled; and that in every instance, by proper experimental inquiry, the true cause can be ascertained.

The principal objects of a proper system of experiments, would be the following:

1. To detect the faults in the ordinary construction of boilers.

2. To adopt more perfect means of preventing dangerous pressure.

3. To acquire such certainty as to the true causes of disasters by explosions that the penal laws on the subject may be strictly and intelligently enforced, and thereby owners, constructors, and those having charge of boilers may be more careful and diligent in the performance of their duties to the public.

In view of these considerations it seems to me that Congress would do very wisely to authorize the government to have a system of experiments made, under the charge of a board of skillful engineers, for the purpose of ascertaining those results, which the increased facilities of the engineering art would now render attainable.

I have the honor to forward with this a copy of the report made by Chief Engineer Isherwood and others of the experiments made at Sandy Hook in November last, to which allusion has been made. A more full report by Professor Thurston, illustrated by drawings, has been published in the *Franklin Institute Journal*.

I also forward the draft of law or joint resolution, which would enable the President, through either of the executive departments, to institute the experiments which I have indicated.

I have taken an interest in this subject, and have presumed to address you upon it, under the belief that the experiments proposed would have more effect in producing the adoption of safeguards against the disasters continually occuring from boiler explosions than any regulations which can at present be made. The whole steam transportation of the country and of the world, and, indeed, the entire commerce of the world, is deeply interested in the ascertainment of the precise laws and exact data on which to calculate and provide for these disasters.

Respectfully, your obedient servant,

JOSEPH P. BRADLEY.

AN ACT TO AUTHORIZE INQUIRIES INTO THE CAUSES OF STEAM-BOILER EXPLOSIONS.

Be it enacted, etc.

That the President of the United States be, and he is hereby, authorized to cause such experiments to be made, and such information to be collected, as in his opinion, may be useful and important to guard against the bursting of steam-boilers, and that he be required to communicate the same to Congress; and that the sum of one hundred thousand dollars be appropriated for the purpose of this act.

Meeting of the National Bar Iron Association.

ON Wednesday May 8, the third meeting of the National Association of Bar Iron Manufacturers was held in Pittsburgh.

The following States were represented: Massa-

chusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Ohio, Kentucky, Indiana, Illinois, Missouri. There are about seventy mills represented now.

The name of the association has been changed and will hereafter be known as the National Association of Iron Manufacturers. The next meeting will be held in September, in New York City. Representatives from all the Iron Mills of the country will be then present.

Aniline Colors.*

By PROF. C. F. CHANDLER.

IT is well understood that coal is an element of our national wealth; and that we derive from it our power. The combustion of 300 lbs. of coal under a steam boiler will produce a power equal to the mechanical force exerted by a man for a year. Another important application of bituminous coal, is to the manufacture of illuminating gas. In this manufacture there are certain residual products, which were at first thrown away; and it is of these that I propose to speak to-night.

Coal tar is produced at the rate of about ten gallons to the ton of coal. Thousands upon thousands of barrels of coal tar were at first thrown away; but when the chemist turned his attention to this substance, he discovered so many products useful in the arts which could be made from it, that coal tar now finds a ready market at $1.50 per barrel. When coal tar is subjected to distillation, the liquid portion passes off, and there remains the heavy black pitch which is used for roofing and for pavements. The liquid portion, which comprises about one-fourth of the original coal tar, produces first a light fluid called naptha, and then a heavy liquid which is called dead oil. The light liquid is a mixture of carbon and hydrogen, of which benzole is the type. It is C12 H6; that is, taking into account the difference of weight, 72 parts of carbon to 6 parts of hydrogen. Other substances are produced from this differing by two atoms of each, making C14H8, C16 H10, C18H12, C20H14, &c.; but, until recently only the first two of these have had any practical importance in the arts. They were used simply as fuel, and as antiseptics, for preserving timber from decay. But lately one of them is claimed to be a specific for the small pox.

After the volatile portions have been removed, there remains this dead oil, which is heavier than water. This was for a long time used as a fuel in glass houses. It was then found that the carbolic acid it contains was a most powerful disinfectant and antiseptic. It was found that it would prevent the spread of the cattle disease; that cattle having the disease in its worst form might be placed with others with safety, if they were protected by this acid. It was found too that the durability of timber was increased four or five fold by its application.

But I wish to-night to invite your special attention to the beautiful colors which have recently been obtained from refuse coal tar. They are naturally subdivided into three groups, the aniline colors, those derived from naphthaline, and the carbolic acid colors. I shall confine my attention wholly to the chemically phase of the subject.

Benzole is a hydrocarbon. Bringing that in contact with nitric acid, an atom of nitrogen carries off an atom of hydrogen; and we have nitrobenzole, which is a very fragrant oil, an artificial oil of bitter almonds, used instead of that substance in the manufacture of soaps. When the nitrobenzole is made to give up its oxygen and take up hydrogen, it becomes aniline.

Nitrogen is a protean element, which gives rise to a great variety of compounds. Ammonia, is NH3; and these three atoms of hydrogen can be replaced by a great variety of substances. Aniline is a similar substance. It is ammonia, replacing one atom of hydrogen by phenyl, which is C12H5. There is no limit to the number of compounds that may be developed on this type; and it opens one of the most important fields of chemical investigation at the present day. All the aniline colors are derived from N3 H9, converted by the process of substitution into new compounds. The first investigation in this direction, which however did not result in any practical product, was that of a German chemist, who found that by treating aniline with chloride of lime, he produced a violet or purple tint. PERKINS, who was the first successful manufacturer of color from coal tar, manufactured a substance to which he gave the name of mauve. Then came the discovery of the rose aniline, which is produced from commercial aniline, pure aniline not answering the purpose. Subjecting commercial aniline to the action of nitric acid, and then to the action of nascent hydrogen, we obtain rose aniline, which is C40 H19 N3. The chloride, hydrochlorate, arseniate, acetate, nitrate, and other salts of this substance produce the beautiful tints, of which I have specimens here. HOFFMANN found that he could change this beautiful red tint of the rose aniline to various shades of violet, by simply boiling it with more aniline. This introduced more phenyl in the place of hydrogen. One atom made it purple, another more bluish, and a third atom of phenyl made it the most beautiful blue that has ever been manufactured.

Replacing the hydrogen with ethyl C4H5, or with methyl, C2H3, we obtain still further colors. In every case the beautiful rose red becomes more and more purple, until the substitution of the last atom of hydrogen converts it into a deep and perfect blue. On carrying the investigation further, it was found that by proper treatment the blue color could be converted into a green, by using ethyl and methyl. Subsequent treatment developed an entirely different base, having the form C40 HI7 N3, with yellow tints; and further treatment produced a brown and finally a black; so that the most durable black for calico printing is now obtained from aniline.

From the coal tar obtained from a ton of coal, three-fourths of a pound of this beautiful color are produced. The coal, which is worth about $6, produces the gas, the coke, the ammoniacal water, largely used for agricultural purposes, the carbolic acid, used for the preservation of timber and as a disinfectant, and finally this beautiful color, which alone is worth nearly as much as the coal originally cost. The amount of this industry has become so enormous that at present five tons of this raw aniline oil are manufactured daily, on the continent alone, and 90,000 lbs. of iodine are used in effecting the substitution; and yet it is an industry which has started since 1860.

A word with regard to the carbolic acid colors. The carbolic acid is obtained by treating the dead oil with an alkali. This furnishes a number of coloring matters. Carbolic acid is C12 H6 O2; or it is the oxyd of benzole, which is C12 H6. Treating carbolic acid with nitric acid, we produce C12 H3 (NO4)3 O2. Picric acid is a substantive dye for silk and wool, uniting with them without any mordant. Treating picric acid with the cyanide of potassium, an acid is produced which gives beautiful garnet colors on silk and wool. By treating carbolic acid with soda and the oxyd of mercury, it is converted into Rosolic acid, which produces various shades of orange, and is used for coloring house paper. Treating this with ammonia, it produces a scarlet tint. The intimate connection existing between the rosolic acid and the aniline colors, is shown by the fact that by treating rose aniline in anhydrous acid, the same result is obtained. From this orange red of rosolic acid, can be produced a deep blue color by the action of aniline.

There is a series of naphthaline colors, but they are not found to be fast, and I will therefore pass them by.

When coal oil is distilled, and 25 or 30 per cent. of volatile products are removed, the result is solid, and is called anthracene. Recently, from this, there has been artificially produced the coloring matter of madder. The colors from aniline had proved brilliant and durable for silk and wool, but not for cotton fabrics. It is now a question whether the colors from anthracene will supply this want; whether they will be found to be permanent. I have here specimens of calicos printed by these colors; and I ask leave to introduce to you, Mr. PARAF, a practical dyer, who has investigated this subject.

Mr. PARAF gave a history of the successive discoveries which had been made in producing dyes from coal tar products, and described his own methods. He expressed his confidence that these dyes could be used for vegetable fibres as well as for silk and wool.

On motion of Dr. VAN DER WEYDE, the thanks of the Association were tendered to Prof. CHANDLER for his lecture. Adjourned.

* A lecture delivered at the Polytechnic Association of the American Institute, April 26, 1872. Illustrated by specimens of the colors and of articles dyed with them.

The Mineral Resources of North Carolina.*

By F. A. GENTH.

CONCLUDED FROM PAGE 308.

There are several promising outcrops of magnetic ore beds in Mitchell County, but most of the other ores are menaccanite, which occurs at the following localities: at Crab Orchard, Crane Creek, and Flat Rock.

In Madison County, on the east Fork of the Big Laurel, a large outcrop of slaty fine-grained granular magnetites, of apparently very good quality occurs, also a highly titaniferous menaccanite, containing nearly 38 per cent. of titantic acid. A bed of specular iron exists at Jewell Hill.

Other beds of magnetic ores in the same county occur in hornblende slates near Fines Creek in Haywood, and in garnetiferous micaschist at several points in Macon County.

I have yet to mention the immense beds of limonite or brown hematite, which occur in several localities in Cherokee County, associated with the limestone or marble and talc, one of which is worked, about a mile from Murphy.

The ore is of very fine quality, compact, also porous and fibrous, in some places ochreous; the quantity is inexhaustible, and beyond doubt the region where these deposits exist will sooner or later become a large iron manufacturing district.

Coal.—The great abundance of iron ores in North Carolina requires for their reduction a large amount of fuel, and the question of its supply has for a time given a great deal of anxiety to those who are most largely interested in the manufacture of iron, as under the present system of forest destruction, instead of cultivation, the manufacture of charcoal iron must eventually be abandoned, although this may not take place for hundreds of years yet to come. It is therefore of the greatest importance that North Carolina contains several kinds of coal, some of which are of excellent quality, and in the immediate neighborhood or within a short distance only of the most valuable iron ore deposits.

I have already stated that the North Carolina coal does not belong to the so-called carboniferous period, but to the triassic; it is of the same age as the coal near Richmond, Va.

In Chatham and Moore Counties is the south-eastern extension, generally called the Deep River Coal Field; in Rockingham and Stokes Counties the north-western of the same beds, or the Dan River Coal Fields. The centre is washed away.

From the investigations of Prof. Emmons and Admiral Wilkes, we learn that the Deep River coal is of the best quality, well adapted for the manufacture of iron and gas, and can be obtained in inexhaustible quantities.

The area underlaid by coal is over forty square miles, containing over 6,000,000 tons of coal to each square mile. The coal measures consist of strata of slates, calcareous shales, alternating with beds of

* From the Journal of the Franklin Institute.

argillaceous carbonate of iron and seams of coal, all inclosed between two beds of red sandstone.

Five seams of coal have been observed; the upper consists of a bed of six and a half feet in thickness, separated by a seam of black band. Near the outcrop it is somewhat contaminated with sulphur, which diminishes, however, as the depth increases. There are several varieties of coal, the highly bituminous and semi-bituminous; near a trapdyke it has lost almost the whole of its volatile matter, and has become an anthracite. According to an analysis of coal from the deep pit in Egypt, by Dr. Jackson, it contains:

Fixed Carbon	= 63.6
Vol. Matter	= 34.8
Ash	= 1.0

An analysis of Egypt coal, which I have lately made, gave;

Moisture	= 0.84
Vol. Matter	= 25.75
Fixed Carbon	= 63.27
Ash	= 10.14
	100.00 per cent.

It contained 1.35 per cent. of sulphur.

An analysis of coal from the Gulf gave me:

Moisture	= 1.16
Vol. Matter	= 21.90
Fixed Carbon	= 70.48
Ash	= 6.46
	100.00 per cent.

Sulphur only 1.02 per cent.

All these analyses show the great value of the Deep River coal.

The Dan River coal field embraces an area of over thirty square miles; it has hardly been developed. Small quantities have been mined near Madison, Rockingham County, which were used by the blacksmith in the neighborhood; and the North Carolina Centre Iron and Manufacturing Co., of this city, has made a few trial pits which have proved the existence of five beds of coal, although it is probable there are others besides.

The coals which I have examined from two of the seams near the outcrop gave respectively, 11.44—13.56 per cent. of ash, 75.96 and 76.56 per cent. of fixed carbon and about 12 per cent. of volatile matter. These results are very encouraging. The Dan River coal field being the north-west continuation of the Deep River, has probably the same seams, and, where the coal is undisturbed, the same quality of coal. These coal fields are not only of general value, but, when it is remembered that they lie in close proximity to some of the largest and best iron beds in the State, their importance can then be fully appreciated.

Diamond and Graphite. North Carolina possesses carbon, not only in the form of several varieties of coal, but also in its two other modifications, as diamond and graphite.

Both occur in the old gneissoid rocks, the graphite in beds interstratified with the micaschist or gneiss; the diamond in the débris of such rocks, associated with gold, zircon, garnet, monazite and other minerals.

It is very remarkable that these two minerals are found in strata of the same age; and these facts remind me of an analogous one, which may throw some light on their origin, viz., in producing the adamantine boron we always obtain the graphitic at the same time.

Diamond has not beon observed in North Carolina in any more recent strata, and in the itacolumite regions *no* diamonds have ever been found, as in Brazil; from which it appears that the itacolumite of Brazil is either simply a quartzose micaslate of similar age with the North Carolina gneissoid rocks, or that, if it is cotemporary with the North Carolina itacolumite, the diamonds were not *produced* in the same but came from older rocks, and were re-deposited with the sands resulting from their reduction to powder and are now found imbedded in the same, their hardness having prevented their destruction. Seven or eight diamonds have thus far been found. They occur distributed over a wide area of surface in the counties of Burke, Rutherford, Lincoln, Mecklenburg and Franklin, and I have no doubt, if a regular search would be made for them, they would be found more frequently. Some of the stones were fine crystals of first water; their weight was from one half karat to about two karats.

Graphite, so much in demand now for the manufacture of crucibles for melting steel and other metals, for lead pencils, as an anti-friction agent, for stove blacking, paint, &c., is found in numerous localities in the State.

The largest beds known since nearly half a century occur a few miles west of Raleigh in Wake County. There appear to be two belts about half a mile apart; the beds contain several seams of greater purity from six to eighteen inches in width. The beds are known to extend for a distance of eighteen or twenty miles.

It has been explored seven miles north-west of Raleigh, and a shaft has been sunk to a depth of one hundred feet. It is mostly mixed with fine grit and is rather slaty, and would require mechanical means for the separation of the impurities. Other beds of graphite, but not so extensive, are found in Lincoln, Caldwell, near Hickory, and in Burke Counties near Morgantown. None of them are developed. The best quality which I have seen came from Alexander County, three miles from Taylor's, and from Cane Creek in Person County.

Sulphur is not found in North Carolina, except occasionally in small crystals, in cavities of quartz, resulting from the decomposition of pyrite. A large supply of sulphur ores will be furnished when the mines of the State are worked to a greater depth. One large vein of pure iron pyrites occurs in Gaston County. Most of the other veins will furnish in addition gold and copper.

Corundum.—Corundum, which, on account of its hardness, is so much sought for as a cutting and polishing material for hard substances, has been found, in a state of great purity and abundance, at several places in the neighborhood of Franklin, in Macon County, in connection with granites and chrysolite rocks.

It is mostly greyish or brownish, but sometimes it assumes a beautiful sapphire blue and ruby color. It is to be regretted that the blue has not yet been found in pieces large enough to be cut for gems, and that the ruby has not the requisite transparency. A large bolder of dark blue corundum was found, many years ago, near the French Broad River, in Madison County. It has lately been observed on the Burnsville Road, 19 miles from Ashville. In small quantities it is found at Crowder's and Clubb Mountains, Gaston County.

The granular corundum or emery is associated with the magnetites of the great titaniferous iron range in Guilford County.

Rutile.—Titanic acid, in the form of rutile, used in the arts to give a peculiar color to artificial teeth, is found in considerable quantity at Crowder's and Clubb Mountains, in Gaston County; also at several localities in Mecklenburg and Mitchell Counties.

Mica, Feldspar, Kaoline, Pyrophyllite.—Hundreds of years ago, long before the Indians occupied the territory of North Carolina, many excavations were made in the numerous large coarse-grained granite beds of Mitchell, Yancey, Cleveland and other counties. In the year 1867 a number of these old mines have been taken up again, and now mining, on a somewhat extensive scale, is going on, and a great portion of mica used in the arts for stoves, lampshades, window panes, etc., comes from Mitchell and Yancey Counties, North Carolina. The mica has mostly a slightly brownish color; it occurs irregularly distributed, through the granite, in rounded pieces, some of them weighing several hundred pounds. It is then split and cut into marketable shapes, which, according to size, will sell from $1 — $10 per pound.

The same localities furnish a very fine quality of orthoclase or potash feldspar, used for glazing porcelain for artificial teeth.

At some of the mines in Mitchell County the orthoclase is almost completely decomposed, and leaves frequently a snow-white kaoline or porcelain clay. It is found at several other localities, as in Lincoln, Burke and Mason Counties.

In the region of the Deep River, in Chatham and Moore Counties, very extensive beds of pyrophyllite slate have been worked for a long time.

It is sometimes called agalmatolite from the fact that from a dense variety of the same rock the Chinese cut and carve their little images, idols and toys. The North Carolina mineral, being entirely free from grit, is largely used as an antifriction material, also for the lining of furnaces, slate-pencils, in the manufacture of wall-paper, as a cosmetic, and for other purposes. Other, though less extensive, beds have been found in Montgomery and Gaston Counties.

Serpentine, Talc.—Only one locality has come to my notice from where a serpentine could be obtained fit for ornamental purposes. It has a dark greenish-black color, contains very small seams of a greenish chrysolite, with silky lustre, and acquires a good polish. Found in large quantities 1½ mile below Patterson, in Caldwell County.

The serpentine found in the chrysolite beds west of the Blue Ridge is of no value.

The most beautiful white, or greenish-white massive, or finely crystallized talc is found, in inexhaustible beds, in many places in Cherokee County.

It is used for similar purposes as the slaty pyrophyllite of Chatham and Moore Counties. Massive and schistose talc, or soapstone, suitable for fireplaces, mantle-pieces, stove-linings, etc., is found in many localities in the State.

Barytes.—This material, when quite white much used as a paint, and more generally for the adulteration of "*white lead*," is found in abundance and excellent quality at several localities. A coarsely granular variety, white, like marble, is found in Union County; another similar one, massive and granular, in a vein from 7 to 8 feet in thickness, in Gaston County, at Crowder's Mountain; and a greyish-white laminated variety, at the Latta mine, near Hillsboro', in Orange County. West of the Blue Ridge it is found, in white granular masses, at Chandlers', nine miles below Marshall, in Madison County.

Alum and Copperas.—Many of the gneissoid slates of Cleveland, Rutherford and other counties contain large quantities of pyrite finely disseminated through them, which, by oxidation, or weathering, produces copperas and alum, both of which were therefrom manufactured on a large scale during the war.

Marble.—Only in one or two localities in the limestones of Stokes and Catawba Counties, a fine-grained variety is found, which would be useful for ornamental purposes if the quantities were not too limited. West of the Blue Ridge, however, in Cherokee and Macon Counties, it is found in large beds, of the finest qualities. There is not only the fine-grained white, resembling that of Carrara, but also the greyish-veined marble, like the Italian, and a most beautiful variety of a fine pink hue.

The limits of this paper are already far beyond my original expectations; and still I might add many more details which would be of interest. In as concise a form as possible, I have indicated and described the principal valuable minerals in the State, and the localities where they occur. I have dwelt rather more fully upon gold, copper, iron and coal, because of their greater importance, especially the two latter, which I believe will prove a source of immense wealth to the State.

My various visits to North Carolina, and more particularly the opportunities afforded me for observations during my trip there last summer, have enabled me to collect many facts and many data relative to the various mines and mining districts, which doubtless would be of interest, but which want of space compels me to omit for the present. I hope, however, that at some future day it will again be my privilege to present the Franklin Institute with farther observations on this interesting subject.

PHILADELPHIA, December, 1871.

THE COAL TRADE.

NEW YORK, May 17, 1872.

Anthracite Coals.

The prospects of the anthracite trade are, if possible, even gloomier than they were last week. It is true that a large proportion of the Schuylkill collieries are idle; but Schuylkill County is not by any means the head and front of the coal production (whatever our friends of the *Pottsville Journal* may think) and the glut in our market still continues. At the auction sale, which comes off a week from Wednesday, the Delaware and Lackawanna people will, it is reported, offer 150,000 tons, and rates are expected to fall even from their present low position. The Pennsylvania Coal Co. will issue on the 20th a circular, which the knowing ones declare will be very low. Altogether, we may look for ruinously depressed prices in June. It is to be hoped that this state of affairs will in some way help to check the over-production which causes so much demoralization in the trade. The talk in which some persons indulge, to the effect that there is a great deal of business doing, and no large accumulations of coal anywhere, is probably intended to persuade dealers to lay in stock now. One paper says "those who have seen fit to stock up will not in all probability lose anything by the operation." The next Scranton sale will tell the story; and dealers can afford to wait for that. But it is well to remember that prices touch the lowest point just before they begin to rise.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending May 11, 1872, compared with the week ending May 13, 1871.

COMPANIES.	1871. WEEK.	1871. TOTAL.	1872. WEEK.	1872. TOTAL.
*Phila & Reading R.R†	51,299	993,175	108,126	1,769,691
Schuylkill Canal	9,815	86,565	21,641	181,906
*Lehigh Valley R. R.	13,324	471,542	49,693	1,272,689
Lehigh & Sus. R. R.	33,537	186,707	37,217	554,006
Lehigh Canal	1,980	7,318	23,421	99,522
Scranton North	13,277	39,078	13,053	215,061
" South			45,656	765,805
Penn. Coal Co., rail	..	3,611	28,312	401,532
" " " canal	....	.....	359	714
Del. & Hud. Canal Co.	....	4,661	52,668	171,209
" " East	..	52,560	14,078	216,966
" " West	....	12,720	7,658	118,356
" " South	....	.....	6,716	123,312
Shamokin	18,766	222,165	9,789	153,932
Trevorton	....	....	....	....
Lykens Valley Coal Co.	2,302	25,582	..	2,580
Wyoming South	....	.....	....	....
Wyoming North	....	.....	....	....
L. N. Y. C. & R. R. Co.	...	35,467	12,433	236,242
Williamstown Co'y	....	17,847	....	....
Big Lack Col	3,783	40,053	....	10,591
Total	148,083	2,198,530	427,820	6,294,135
1870	....	....	148,083	2,198,530
Decrease				
Increase			279,737	4,095,605

* These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending May 11, 1872, compared with week ending May 13, 1871.

COMPANIES.	1871. Week.	1871. Year.	1872. Week.	1872. Year.
C. & O. Canal	20,301	169,130	18,662	136,857
B. & O. R. R.	27,975	402,520	29,134	414,705
H. & B. T. R. R.	10,132	130,323	6,650	101,487
*Harrisburg & D.	15,365	214,936	9,231	210,232
*L. V. R. R.	....	23,325	....	12,218
P. & N.Y.C & R. Co.	6,919	106,544	5,524	140,112
Cumberl'd Branch Canal	5,853	51,230	5,989	45,492
" Railroad	1,753	27,825	884	4,531
Total	88,296	1,125,833	75,823	1,065,444
	75,823	1,065,444		
Decrease	12,473	59,389		
Increase				

Lehigh Canal Coal Trade.

Shipped for the week ending May 10, 1872.

	Week. Tons. Cwt.	Week. Tons. Cwt.
Total from Mauch Chunk Region	8,588 12	36,930 12
" " Beaver Meadow "	4,271 13	17,642 14
" " Tresckow "	883 07	3,590 14
" " Mahanoy "	484 05	2,019 08
" " Hazleton "	7,302 14	32,707 14
" " Upper Lehigh "	1,221 00	4,130 08
" " Wyoming "	669 08	2,500 11
Total	23,420 19	99,522 01
Corresponding week last year	1,979 12	7,317 08
Increase	21,441 07	92,204 13
Decrease		

Shamokin Coal Trade.

For week ending May 11, 1872	9,788 19
Same time last year	18,766 04
Increase	
Decrease	8,977 05
Total amount shipped to date	153,931 14
Same time last year	222,164 18
Increase	
Decrease	68,233 05

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, May 11, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair	21,793	18
" Port Carbon	5,205	10
" Pottsville	2,709	02
" Schuylkill Haven	24,549	05
" Pine Grove	5,125	04
" Tamaqua	11,357	04
" Harrisburg		
" Dauphin	4,179	09
Total	75,919	12

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	9,057	05
" Mill Creek "	2,725	06
" Schuylkill Valley Scales	904	09
" Mt. Carbon "	459	18
" Cressona "	8,326	03
" Pine Grove "		
" Tamaqua "	1,390	18
Total	22,863	19

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	1,858	01
" Shamokin	3,681	14
" Herndon	.....	
Total	5,539	15

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	780	18
" Lebanon & Pine Grove Branch	921	47
Total	1,702	05

CONSUMED ON LATERALS.

From Frackville Scales	509	14
" Mill Creek "	611	19
" Schuylkill Valley Scales	209	08
" Mt. Carbon "	371	03
" Cressona "	97	03
" Pine Grove "	196	17
" Tamaqua "	15	16
Total	2,012	00

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a Br.	27	17
" " Alburtis, "	16	00
" " Oreland, G. & N. Br.	547	10
" " Connecting R. R.	...	..
" " Willow Street R. R.	398	18
Total	988	05

BITUMINOUS.

From Harrisburg	9,220	19
" Connecting R. R., G. & N. Br.		
" Junction R. R.	10	00
Total	9,230	19

COAL FOR COMPANY'S USE.

Anthracite	4,261	02
Bituminous	266	02
Total	4,527	04

RECAPITULATION

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leb. Val. Branch	75,019 12	22,551 15	i 52,469 17
For Shipment by Canal	22,863 19	11,601 06	i 11,262 13
Shipped Westward via Northern Central R. R.	5,539 15	13,570 02	d 8,030 07
Shipped West or South from Pine Grove	1,702 05	1,425 11	i 276 14
Consumed on Laterals	2,012 01	2,071 16	d 59 16
Lehigh and Wyoming Coal	988 05	78 00	i 910 05
Total Anthracite paying freig't	108,125 16	51,298 10	i 56,827 06
Bituminous	9,230 19	15,364 10	d 6,133 11
Total of all kinds paying freig't	117,356 15	66,663 00	i 50,693 15
Coal for Company's use	4,527 04	5,233 17	706 13
Total Tonnage for Week	121,883 19	71,896 17	i 49,987 02
Previously this year	1972396 15	1232916 16	i 739,479 19
Total to date	2094280 14	1304813 13	i 789,467 01
SHIPPED BY CANAL.			
From Schuylkill Haven	18,829 00	5,252 00	i 13,577 00
" Port Clinton	1,812 00	550 00	i 1,262 00
Total Tonnage per Week	20,641 00	5,802 00	i 14,839 00
Previously this year	161,284 19	81,506 17	i 79,778 02
Total to date	181,925 19	87,308 17	i 94,617 02

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, May 11, 1872.

	Tons.	Cwt.
From Schuylkill Haven	18,829	00
" Port Clinton	1,812	00
Total for week	20,641	00
Previously this year	161,284	19
Total	181,925	19
To same time last year	86,564	17

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, May 11, 1872.

	WEEK.	SEASON.
North	51,624 12	885,115 11
South	6,716 04	123,312 06
Total 1872	58,340 16	1,008,427 17
Corresponding time in 1871:		
North	Suspension.	
South	"	
Total		
Increase North		
Decrease North		
Increase South		
Decrease South		
Total decrease 1872		
Total increase 1872	58,340 16	1,008,427 17

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending May 4, 1872.

	Week. Tons.	Cwt.	Total. Tons.	Cwt.
Anthracite received:				
From Lehigh Valley R. R.	7,603	15	135,626	17
" Lack. & B. R. R.	1,847	16	33,771	03
" Pleasant Valley R. R.	1,537	06	42,392	09
" Sul. & Erie R. R.	1,443	16	24,452	08
Total	12,432	13	236,242	17
Distributed:				
To Lehigh Valley R. R.	391	18	22,410	14
To Lack. & B. R. R.			1,017	17
To S. Central R. R	1 567	09	46,660	18
To Ithaca & A. R. R.	3,877	00	51,024	17
To Erie R. W. Pockets for shipm't.	6,287	17	74,897	00
To individuals on line of road	141	03	11,843	02
To points at & above Coxton for use of Co	340	03	10,976	19
To points between Waverley and Elmira	337	03	17,341	10
Total	12,432	13	236,242	17
Bituminous:				
Received from Barclay R. R.				
Shipped North from Towanda	5,211	05	138,975	03
Shipped South from Towanda	42	18	1,045	16
Northern Central R. R.			91	01
Total	5,254	03	140,112	00
Distributed:				
To Erie R. R.	4,360	12	123,389	07
To So. Central R. R.	850	13	15,434	01
To Ithaca & A. R. R.	.....		21	15
To Lehigh Valley R. R.	2 095		821	11
To individuals on line of R R			306	00
To points on line of road for use of Company	17	09	139	06
Total	5,254	03	140,112	00

Delaware and Hudson Canal Company.

The following is a statement of Coal Transported by the Delaware and Hudson Canal Co. for the week ending May, 11 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	52,668	171,209
By Railroad, East	14,078	216,966
" " West	7,658	118,356
" " South	6,716	123,312
Total Tons	81,120	629,843

For the same period last year.

	FOR THE WEEK	FOR THE SEASON.
By Delaware and Hudson Canal,		4,660
By Railroad, East,		52,560
" " West	.....	12,720
" " South	.....	.....
Total Tons		69,940
Increase		559,903

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, May 11th, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	11,052 14	215 060 10
Shipped South	45,655 16	765,805 05
Total	56,708 10	980,865 15
For the Corresponding time last Year:		
Shipped North	.....	.....
Shipped South	.....	.....
Total	23,277 06	39,057 10
Increase	33,431 04	941,808 05

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending May 11, 1872.

	1872. WEEK.	1872. YEAR.	1871. WEEK.	1871. YEAR.
By Railway	28,372 01	401,532 07	No Shipment.	3,610 14
" Canal	358 13	714 04		
Total	28,670 14	402,246 11		3,610 14
Increase 1872		398,635 17		

Lehigh Coal and Navigation Company.

Report of Coal transported over the Lehigh Canal and L. & S., Div. of Central Railroad of New Jersey for the week ending May 11, 1872, and for the year 1872.

	WEEK.	YEAR.
Forwarded East of Mauch Chunk by Rail	37 217	554,005
Delivered at and above do.,	1155	22,797
Forwarded East of do., by Canal	23,420	99,522
	61,793	676,324
Corresponding period last year—		
Forwarded East of Mauch Chunk by Rail	33,537	186,207
Delivered at and above do.,	593	19,784
Forwarded East of do., by Canal	1,979	7,317
	36,113	213,318
Increase on Railroad	4,239	370,806
Decrease " "		
Increase on Canal	21,441	
Decrease " "		92,204
Of the above there was transported on account of—		
Lehigh Coal Nav. Co	25,026	208,396
Wilkesbarre Coal & Iron Co	21 655	312,020
	46,682	520,417
Corresponding period last year—		
Lehigh Coal Nav. Co		22,121
Wilkesbarre Coal & Iron Co	33,765	160,065
	33 765	182,187
Increase	14,916	338,230
Decrease		

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday May 11, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C. & O. Canal Tons. Cwt.	To B. & O. R.R. C. Tons. Cwt	Total. Tons Cwt.
1872	18,662 07	29,131 17	47,796 04
1871	20,305 12	27,974 16	48,280 08
Increase		1,159 01	
Decrease	1,643 05		484 04

YEAR.

1872	136,857 08	414,705 01	551,562 09
1871	169,130 02	402,519 17	571,649 19
Increase		12,185 04	
Decrease	32,272 14		20,087 10

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons Cwt.	Total. Tons. Cwt.
1872	5,989 00	883 12	6,872 12
1871	5,852 17	1,753 01	7,605 18
Increase	136 03		
Decrease		869 09	733 06

YEAR.

1872	45,291 16	4,530 14	49,822 10
1871	51,230 19	27,825 06	79,056 05
Increase			
Decrease	5,939 03	23,294 12	29,233 15

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending May 11—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872, tons ct	WEEK 1871, tons ct.	YEAR 1872 tons cwt.	YEAR 1871, ons. cwt.
Wyoming Region	34330 13	35386 18	430644 08	186593 11
Upper Lehigh Region	3358 07		68718 15	4614 06
Beaver Meadow Region				
Hazleton Region	6817 04	455 05	37455 11	2151 01
Mahanoy Region				
Tresckow Region	2962 16		34165 18	1043 03
Mauch Chunk Region	8786 18		140906 15	21165 14
Totals	553 5 12	36442 03	711831 07	215477 15
Increase	18913 09		496353 12	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	37217 06	35537 01	554035 15	186207 06
Forwarded East of Mch Chunk by Canal	12476 02	1628 05	57063 14	6006 03
Delivered at and above Mauch Chunk	1155 06		22797 00	19788 16
L. V. R. R at Packer'n	376 13	596 08	5735 16	3415 10
Delivered to L. & B. R. R. at Plymouth Bridge		680 09		
	4130 05		72229 02	
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co	16438 05		171466 03	22402 01
W.-B. C. & I. Co	21655 08	33765 09	312020 14	160065 17
Totals	38093 13	33765 09	483486 17	182467 18
Increase	4328 04		301018 19	
Decrease				

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending May 11, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	11416 08	219,470 08
" Hazleton	39319 09	858,791 07
" Upper Lehigh	21 08	1,235 00
" Beaver Meadow	12,817 18	312,930 09
" Mahanoy	10,652 00	130,120 05
" Mauch Chunk	77 14	1,542 00
Total	71,904 17	1,524,098 09
Same time last year	15,049 02	532,864 06
Increase	56,874 15	991,234 03
Decrease		
Forwarded East from Mauch Chunk by rail	49,692 16	1,272,688 13
Same time last year	13,324 02	471,541 18
Increase	36,368 14	801,146 15
Decrease		

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	49,919 08	1,250,357 06
do East for use L. V. R R	673 08	22,331 07
Delivered at and above Mauch Chunk for use of L. V. R.R.	976 12	26,144 17
To P. & N. Y. R. R	7,603 15	135,626 17
To N. C. R. R., at Mount Carmel	229 19	907 12
To D. H & W. R. R	652 07	12,151 07
To L. & S. R R at Packerton for rail	164 11	6,378 07
Delivered at M'h Chunk	10 01	919 09
Delivered on line of road above Mauch Chunk	186 05	9,337 01
To L. & S. R. R., at Penn Hav., for railroad		3,950 07
Do. for canal	7,302 14	33,173 11
To Lehigh Canal Mauch Chunk	4,857 01	19,683 16
To Catawisa Railroad	228 16	3,076 12
Total	71,904 17	1,524,098 06

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

Company Coals.

May, 1872.

	L.	Str.	Gra.	Eg.	Sto	Chest
*Scranton at E. Port	3 47	3 53	3 60	3 63	4 09	3 58
*Pittston at Newburg	3 90	3 90	4 00	4 10	4 25	4 00
*Lackawana at Weehawken	3 75	3 75	3 85	3 85	4 25	3 75
Wilk'b're at Hoboken	3 75	3 75	3 85	3 85	4 35	3 80
Old Co. Lehigh at Pt John'n	5 15	—	4 35	4 35	4 60	4 60
Lehigh at Eliz. Port	5 00	—	4 25	4 25	4 50	4 00

For freights to different points see "Freights."

* To contractors only.

	AT NEW YORK. May 17. R. A.	W. A.	AT PHILADELPHIA. May 17. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	5 25	4 75	— —	— —
Stove	5 50	5 00	— —	— —
Chestnut	4 25	—	— —	— —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 00	—	— —	— —
Broken	4 75	— —	— —	— —
Egg	4 50	— —	— —	— —
Stove	5 25	— —	— —	— —
Chestnut	4 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Honey Brook, Le'h W.A.	4 00@4 75		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Creek " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Old Comp'y's " "	4 00@4 75		— —	— —
Room Run " "	4 00@4 75		— —	— —
McNeal " "	— —		— —	— —
Girardville " "	— —		— —	— —
Hill & Harris " "	— —		3 10@4 00	— —
Shamokin " "	— —		— —	— —
Lykens Valley " "	— —		— —	— —
Broad Top " "	— —		— —	— —
McMichael " "	— —		3 25@4 25	— —
Henry Clay " "	— —		— —	— —
Powelton " "	— —		— —	— —

Dealers in these coals may be found in our advertising columns.

Prices at Baltimore—May, 1872.

Wholesale Prices to Trade.

Wilksbarre, by cargo or car load	$4 60@4 85
Pittston and Plymouth, do	4 60
Shamokin Red or White Ash, do	4 75
Lykens Valley Red Ash, do	5 50
Zerba Valley	
Treverton	
By retail, all kinds per ton of 2,240 lbs	6 50@7 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60@4 65
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Consolidation Coal Co.'s on board N. Y.	
Maryland Coal Co " "	

Prices at Georgetown, D.C., and Alexandria, Va.

May, 1872.

George's Creek and Cumberland f. o. b. for shipping $ 4 75

Bituminous Coals (Cumberland).

Georgetown, F.o.b	$4.25
Baltimore	4.70
New York	6.75

Prices of Gas Coals.

May, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N.Y

Duty, $1 25, gold

	Coarse	Slack.
Block House	$1 60	$- 75
Gowrie	1 60	— 75

Vessels are being chartered at $3 00 to $3 25.

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	1 25
Sydney	2 25	- 80
Lingan	1 60	- 80
Little Glace Bay	1 60	1 00
Caledonia	1 60	- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal

AMERICAN.

	Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
AT PHILADELPHIA.	
Westmoreland	6 00 @— —

Foreign and Provincial Freights.

May 1872.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £

Liverpool, 5 per cent primage

TO NEW YORK.

Provincial	
Sidney	$3 00
Lingan	3 00
Cow Bay	3 25
Port Caledonia	3 25
Little Glace Bay	3 25
TO BOSTON.	
Sydney	2 90
Lingan	2 90
Cow Bay	3 00
Port Caledonia	2 90
Little Glace Bay	2 90

Prices of Foreign Coals.

May, 1872.

Duty $1 25 per ton.

Corrected weekly by FARMELE BROS., No. 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	12 00@13 00
" House "	18 00@20 00
" " Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$14 00@16 00
"Cannel, "	19 00@23 00

Per ton 2,000 lbs. delivered.

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption ($1 85 less 55c' drawback	$1 30
For reshipment	1 75

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 66
C. R. R., N. J., Phillipsburgh to Elizabethport	0 98
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$1 99

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 66
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Phillipsburgh	66
Morris & Essex R. R. Phillipsburgh to Hoboken	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO SOUTH AMBOY.

L. V. R. R.	66
B. & D. R. R.	97
Cam. & Am. R. R.	
Shipping Expenses	35
Total	$ 198

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 78
C. RR. of N. J. Phillipsburgh to Elizabethport	0 98
Shipping expenses	25
Wharfage	10
Total	$ 1 12

Freights.—May, 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Philada.	Anthracite. From Elis. Port, Port Johnston, and Hoboken.	Anthracite. From Newburg	Anthracite. From Rondout
Amesbury				2 30		
Bangor				1 75		
Bath		3 00				
Boston	3 25	3 00	3 75	2 00	2 15	2 35
Bridgeport	2 50	2 40		1 60	1 10	1 25
Bristol				1 50		1 75
Derby				1 25		
Dighton						
East Cambridge				2 00		
Fall River		2 75		1 50		1 75
Hackensack						
Hartford				1 50		1 75
Hoboken				50		
Jersey City	2 10			50		
Middletown				1 30		1 50
Mystic				1 25		
New Bedford	3 00	3 00		1 55		1 80
Newburyport		3 25		2 15		2 50
New Haven	2 60	2 50		1 00	1 10	1 25
New London	2 60	2 75		1 25	1 40	1 50
Newport				1 50	1 65	1 75
New York	2 25	1 90		50		65
Norwalk				1 00		1 25
Norwich		2 75		1 35	1 50	1 60
Pawtucket	3 00	3 00		1 50	1 75	1 90
Portland	3 25	3 00		1 90		2 10
Portsmouth, N.H	3 50	3 25				
Providence	2 70	2 75		1 50	1 65	1 75
Rockport						
Saco						
Sag Harbor				1 30		
Salem	3 25	3 25		2 00		2 50
Stamford				1 00	1 10	
Stonington				1 25		1 60
Taunton				2 00		
Warren				1 50		
Washington						
TO RIVER PORTS						
Albany					55	
Catskill					50	
Cocksackie					50	
Coeyman's					65	
Cold Spring					20	
Fishkill					20	
Haverstraw					40	
Hudson	2 50				40	
New York						
Nyack					45	
Poughkeepsie	2 50				30	
Rhinebeck					30	
Rondout					30	
Saugerties					40	
Sing Sing					50	
Stuyvesant					55	
Tarrytown					50	
Troy		2 40			75	
West Point					20	
Yonkers					50	

MARKET REVIEW.

FOR THE WEEK ENDING MAY 16, 1872.

IRON—The market for Scotch Pig is a little lower, consequent upon heavy arrivals, but prices are pretty firm at the reduction, on account of advances per cable showing an advance of 4s. on Scotch and 5s. for warrants. We note sale of 200 tons Glengarnock at $50; 1500 do. here, brand not named, and to arrive at Philadelphia (a near arrival), 2500 do., principally Glengarnock, and 100 do. Eglinton, all on private terms. We note Gartsherrie about $52 @ $53. The market for American Pig is firm, but the demand is light; we quote No. 1 $48 @ $52, No. 2 $47 @ $51, and Grey Forge $45 @ $50, with sales of 1000 tons X. and 2 X. and Grey Forge, on private terms. Scrap is scarce and large quantities cannot be had—small lots bring $60 @ $61. The only sale we heard of is 250 tons Wrought, on terms not made public. Old Rails continue firm—we quote T and Double-headed $50 @ 52, with sales of about 1200 tons on private terms. Bar &c, from store, continue steady and firm at our last figures, with a fair demand.

PHILADELPHIA, May 13.—(From Circular of Edward Samuel.)—All grades of American and Scotch Pig Iron have been excessively quiet for the past week, and the quotations are purely nominal, as sales are reported at quite different figures. Old Rails are dull. Scrap is in fair demand.

COPPER.—No change has been made in the prices of Manufactured, and we continue to quote New Sheathing over 12 oz. 46 cents, and Bolts and Braziers 48, Bronze and Yellow Metal Sheathing 30, and Y. M. Bolts 35, net

cash. The market for Ingot on the spot is very dull, and prices still shrink as the time approaches for the recipts of new crop Lake; we have only to notice small sales at 38¼a39 cents. For future delivery, there is an unsettled feeling, consequent upon the strike of the miners in the Lake Superior region, and prices close half a cent a lb. higher, with considerable business, say 700,000 lb. for June, July and August at 34½a35 cents—now firm at 35. English has sold more freeley, the causes noted above having a somewhat favorable effect; the transactions embrace 50 tons Best Selected at 32 cents; and 100,000 lb., in lots, 32½a33½. This article coutinues to come forward freely on old orders, but the most of the receipts have been placed in bond, waiting the future of our own and the European markets.

LEAD—The Goverment is supplying the demand for Pig again at $6,30 gold, and have sold 2a300 tons. This interferes with importations, and the market is very quiet, but firm at 6¼a6¾ cents gold for ordinary Foreign; 50 tons Spanish sold at the latter price. Refined is held at 7 cents. Bar is steady at 8¾ cents, Sheet and Pipe 10½, and Tin-Lined Pipe 15, cash, usual discount to the Trade.

SPELTER—Remains dull, the Brass Manufacturers not buying on account of the high price of Copper; ordinary brands of Silesian are offered freeley in whole parcels at 7 cents, domestic is quoted at 11 cents currency. We have only to notice the sale of 15 tons prime brand at 7¼ cents, gold.

STEEL—The market is without change, or any movement beyond the ordinary demand for consumption, and this at previous quotations.

TIN—Pig remains very dull, and prices are irregular, but favor buyers; the sales have been confined to a few small parcels Straits, say 100 slabs, at 38¾ cents; 150 do., 39½, cash; and 100 do., 39, 30 days, all gold. English and Banca Tin is entirely nominal. Plates though firm, are very quiet; sales have been made of 800 bxs. Charcoal Tin at $13,75 for I. C. Coke 14 by 20, $12,25a$12,37½; and 100 bxs. do., 10 by 14, $12,50, all gold.

ZINC—Sheet is steady at our quotations for lots as wanted from store. 50 casks Mosselman sold from agents' hands, at 9½ cents less 4 per cent., gold.

WHITE OXIDE FRENCH.....10 cents gold
" " AMERICAN.....10 cents currency
MANGANESE BLACK OXIDE.....3½ cents currency
" "PEROXIDE PYROLUSITE.....5½ cents currency

We extract the following from a circular of Fraser & Co. dated "Penang," Mch. 29, 1872.

TIN—None has yet come from Laroot, although the riots are suppressed, and but little has arrived from Junk Ceylon. The market opened at $37 a picul, and shortly advanced to $37,20a$37,35, at which about 2000 piculs were purchased. Subsequently, the demand has been rather less, and small parcels have been obtained at $36,75, which is, however, now freely offered by buyers without success. The quantity held by the Chinese is very small.

METALS.

NEW YORK, May 16, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	49 00@52 00
Pig, American, No. 1	48 00@52 —
Pig, American, No. 2	47 00@51 —
Pig, American, Forge	45 00@50 00
Bar Refined, English and American	— —@105 00
Bar Swedes, assorted size (oi	— —@160 00
	Store Prices, Cash.
Bar, Swedes	125 00@135 00
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ¾ to 1 in.	110 00@— —
Bar, Refined, 1½ to 6 by ¼ & 5:16 & 2½ to 2¾ rnd. sq..	115 00@— —
Bar, Refined. 1 & 1½ by ¼ & 5:16	117 50@— —
Large Rounds	122 50@127 50
Scroll	122 50@152 50
Ovat and half-round	127 50@137 50
Band	— —@122 50
Horse Shoe	120 00@130 00
Ro ls, ⅝ to 3-16 inch	115 00@155 00
Hoop	135 00@177 50
Nail rod	8 @— —
Sheet, Russia, as to assortment (gold)	—@ 18 ½
Sheet, Singles, D. and T. Common	—6½@— 7¾
Sheet, D. and T. Charcoal	—7½@— 8½
Sheet, Galv'd, Nos. 10 to 27, list 10 per cent discount	—@— —
" " Nos. 28, and 29.	—@— —
Rails, English (gold), ℔ ton	74@75 00
Rails, American, at Works in Pa.	83@85 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 46
Copper Bolts	— @— 48
Copper Braziers, 16oz. and over	— @— 48
Copper Nails	— @— 51
Copper, Old Sheathing, &c. mixed lots	— @— —
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper English Pig	32½@— 33½
Copper, American Ingot	38 @— 39
Yellow Metal, New Sheathing & Bronze	— @— 30
Yellow Metal Bolts	— @— 32
Yellow Metal Nails	30 @— 32

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs	$— @—
Spanish (gold)	6 62½@—
German, do.	6 62½@—
English do.	6 62½@7 00
Bar (net)	6 75 @—
Pipe (net)	— —@10 50
Sheet	— —@10 50

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ℔ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. Store prices.

English Cast (2d and 1st quality) ℔ lb	— 16¼@— 18½
English Spring (2d and 1st quality)	— 7½@— 10½
English Blister (2d and 1st quality)	— 10½@— 17½
English Machinery	— 11½@— 13½
English German (2d and 1st quality)	— 10½@— 12
American Blister "Black Diamond"	— —@— 12
American, Cast, Tool do.	— 15 @— 16
American, Spring, do.	— 9 @— 11
American Machinery do.	— 10 @— 10½
American German, do.	— 9 @— 11

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	48 @49
Straits	38¾@39½
English	39 @39½

PLATES. Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$13 75 @14 00	$15 75 @16 25
I.C., Coke	12 50 @13 50	14 25 @15 25
Coke Terne	10 75 @11 25	12 50 @13 00
Charcoal Terne	12 50 @13 00	14 25 @15 00

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb
Plates, Foreign.....(gold).....p. 100 lb. 7 00 @ 7 25
Plates, Domestic.....p lb. — 7 @— 11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per lb
Sheet..... per lb.— 10½@— 11

San Francisco Stock Market.

BY TELEGRAPH.

The following report from the San Francisco Stock Board is dated the 14th inst. With the exception of a decline in Chollar and Gould & Curry the list has slightly advanced, and seems to firmly sustain the remarkable position which it held immediately following the recent panic. It will be observed on a comparison of the two annexed reports, that excepting the advanc in Imperial and the decline in Belcher "both to nominally the same quotations as we gave last week," the changes amount to comparatively nothing.

	May 9.	May 14.
Savage	500	490
Crown Point	1750	—
Yellow Jacket	192	207
Kentuck	470	—
Cholliar Potosi	147	105
Gould & Curry	370	365
Belcher	1200	1025
Imperial	200	320
Hale & Norcross	—	—
Eureka C. V.	—	19
Ophir	—	—
Alpha	—	—
Raymond & Ely	—	—
Amador	—	300

Mining Stocks.

NEW YORK, May 15, 1872.

Almost without exception the Mining Stock List is weaker. No sales of any importance are reported by the Board; Walkill assent "Lead" is quoted at .04c. per share. The following is the report.

	BID.	ASKED.
American Flag	30	40
Bates & Baxter	40	—
Benton	5	8
Black Hawk	1 05	1 25
Jasco Gold	—	—
Central Gold	9	12
Cons Gregory	40	55
Grass Valley	10	12
Gunnell	1 25	1 50
Holman	4	10
La Grosse	50	55
Liberty	3	4
Montana	2	5
Rocky Mount	—	14
Quartz Hill	38	44
Smith & Farm	45	55
Texas	5	15
New York and Eldorado	9	12

Petroleum.

The petroleum list remains almost as quoted in our last with no sales the report is as follows:

	BID.	ASKED.
Bennehoff Run	20	30
Bergen Coal and Oil	—	40
Blood Farm	5	—
Bliven Oil	—	50
Breevoort	1 75	3 00
Buchanan Farm	40	50
Central	50	55
Home	1 35	1 50
New York & Allegheny	1 25	—
Northern Light	30	—
Phillips Pet	5	15
Pithole Creek	—	1 00
Rathbone Oil	20	30
Rynd Farm	20	28
Second National	—	40
United Petroleum Farms	27	30
United States	35	55
Clinton	—	—
National	—	—
Sherman & B	—	—
Tarr Farm	10	—
Webster	—	—

MISCELLANEOUS.

NOTICE is hereby given, that the annual meeting of the Stockholders of the Scientific Publishing Co. will be held on Wednesday, May 29th. at 12 o'clock, at the office, 27 Park Place, New York City. WM. VENTZ. Secretary.

T. F. VAN WAGENEN, E. M.
MINING AND CONSULTING ENGINEER.
GEORGETOWN, COLORADO.

Examinations and Reports made on Mineral property. Contracts made, and mines taken charge of and worked

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MINING & RAILWAY CONTRACTORS, SINKERS, &c.
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Martin Cast-Steel, Gun-Barrel and Component Iron,
PUDDLED AND REFINED CHARCOAL BLOOMS,
Ringwood Anthracite and Charcoal Pig Iron.
Works at Trenton and Ringwood, N. J.
May 17:1y

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DEPARTMENT OF POPULAR SCIENCE.

Meteorology.

AT a recent meeting of the Polytechnic Association, Prof. ORAN W. MORRIS read a paper on this subject, from which the following paragraphs are extracted and condensed :

Meteorology is not yet an exact science, but it is making rapid progress. Not long ago scarcely anybody, not even sailors, would admit the possibility of a science of the weather. When ESPY broached his theory of storms, and REID, PIDDINGTON and REDFIELD published their labors, they were poorly appreciated at first. But facts have been accumulating, and such men as MAURY, LOOMIS and HENRY in this country, and GLASIER, WHEWELL and LAPLACE abroad, have arranged and discussed them; and now no sea-captain disclaims the aid of instruments, while sailors, farmers, and all citizens acknowledge the benefit of the scientific "probabilities" of the Signal Service.

The plan now so ably conducted by General MEYER was predicted, and indeed attempted, by Prof. HENRY of the Smithsonian Institute, who made use of telegraphic weather dispatches in 1856, and showed by colored tokens on a map of the United States the meteorological condition of the atmosphere over the whole country. But the work was not prosecuted, because the necessary means could not be obtained. The perfection to which it is now carried, under skilfull superintendence and with Congressional aid, is well known.

The height of the atmosphere is about 50 miles. At the equator it is about four miles higher than in the polar regions. The peculiar properties of air which here concern us are these : it cannot be frozen, but contracts by cold and expands by heat, thus giving rise to currents ; it is capable of great compression, and recovers its volume with perfect elasticity ; it will sustain at each point of temperature a certain amount of watery vapor.

All bodies radiate heat while they receive it. If the amount received is greater than that given out, the temperature of the body rises, and *vice versa*.

In the days of summer in this latitude, the earth receives more heat than it gives off during the night—until about July 25th, when the proportion of radiation is increased. In August, it is in excess, and the mean temperature declines.

The direct rays of the sun within the tropics expand the air there, and it rises so that the cold air rushes in ; and this, influenced by the rotation of the earth on its axis, causes the trade winds. The rarified air rises and flows in an upper current towards the poles, losing its heat and sinking in its progress, until at length its course is deflected, and it returns to be again heated.

There is a relation between the local temperature and the direction of the wind. Thus, with us, a southerly wind generally causes the mercury to rise, not far, on the average, from four per cent. Southwest and west winds are mostly pleasant, and do not cause much change. Northwest and north winds depress the temperature, sometimes 20 deg. Northeast and east winds are the most unpleasant and generally cold. The effect of rainy days in summer is to reduce the temperature, on the average, about 5 deg. Snowy days in winter raise it on the average about 4 deg.

From a record kept for 27 years, in this city, it appears that the mean temperature for that period is 52.12 degrees. The mean maximum is 55.41 degrees, and the mean minimum, 49.58 degrees. The mean or 1845 was 51.45 degrees ; and for 1871 it was 52.81 degrees—no very great change in climate. Of the 27 years, 9 were about the mean of the series, exactly agree with it, and 16 were below it. The highest heat noted was 98.8 degrees in June, 1867; he lowest, 13 deg. below zero in December 1865, and January 1866. The warmest mean daily temperature was 91.26 degrees, June 26 1864 ; the coldest, 0.5 degrees, February 6, 1865. The temperature of the different seasons is shown by the table to be quite uniform. The annual rainfall for the 27 years was 49.98 inches ; the maximum, in 1871, 63.11 inches ; the minimum, in 1845, 35.35 inches. The greatest quantity for any one month was 10.42 inches in June 1865 ; the least, 0.65 inches in January 1849—a year which gave in all only 35.546 inches, or nearly 14½ less than the average. The average number of days in which rain or snow fell was 140.7 ; the greatest number in any one year, 169 in 1862 ; and the least, 99 in 1853.

A register kept in Brunswick, Maine, covers a still longer period—from 1807 to 1859. From 1807 to 1832, the mean annual temperature was 44·1 degrees, and from 1833 to 1860 it was 44.7 degrees. It is evident from such data as these that no serious change is taking place in the climate of the Atlantic coast, nor do the figures support the very common theory of a "cold spell" about the end of May, and another, about the end of October.

To return to the New York records. Among the occasional phenomena observed, in the past 27 years, the aurora occurred 217 times (the years 1852 and 1853 being omitted from the record), the greatest frequency being in 1870, and the least in 1855, or rather in 1845 and 1861, when none were observed. Three earthquakes were felt here, in 1848, 1870 and 1871. An occultation of Venus with the moon happened in 1860 ; and lunar rainbows are recorded as unusual phenomena, in 1861 and 1869.

According to another record, kept by C. BOGART, Esq., and covering the years 1816-1835, the mean temperature for that period was 44·6 degrees, the maximum 96 deg. in May and June 1831, and the minimum 10 deg. below zero in 1821. In the year of the first cholera, 1832, the mean temperature was 52.21 degrees, or nearly that of the whole period since 1845, and the maximum, in July, was only 88 deg. So the cholera could not be said to have come with specially hot weather.

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. It is believed that several names of members and associates elected at the Bethlehem meeting in August, 1871, have been accidentally omitted by reason of the loss of a portion of the records of that meeting. Such persons, or their friends, are requested to communicate with the Secretary.

II. All members and associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All members and associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute, and all notices of meetings. Back numbers cannot, as a general rule, be sent.

III. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or semi-annual volumes to which those members and associates will be entitled who have paid their dues.

IV. Authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

The annual meeting of the Institute will be held in the city of New York, commencing on Tuesday evening, May 21st, at 8 o'clock, in the Cooper Union Building, at the head of the Bowery.

A meeting of the Council will be held at the office of the ENGINEERING AND MINING JOURNAL on Tuesday afternoon, May 21, at three o'clock. Members of the Council will take notice that the office of the JOURNAL has been removed to 27 Park Place, corner of Church street.

The Stockton Mines.

The mines in this vicinity lie in blue limestones, which strike E. and W. and dip steeply to the north. There appear to be four distinct zones, running along the strike of the country-rock, which carry ore. Besides the blue limestones occur intercalations of crystalline, greenish-white dolomites and quartzose slates ; and dikes of dioritic porphyry and quartz-veins are frequently met with. The latter strike generally N. and S. or NE. and SW., but sometimes E. and W. Near the surface these veins generally carry good ore along the foot-wall, which continues to a certain depth ; but as sources of a very large supply of ore they appear to be, like the same class of veins in other western localities, not very valuable.

On the ore-zone furtherst to the North, are situated the Grand Cross and Josephine. Next follows the Tampico zone with the Tampico, Bolivia and Paul Pry claims ; then the Silver King zone, on which the Fuller, Knickerbocker, Silver King, Silver King Extension, Tucson and Argent are located. Finally comes the zone containing the Metropolitan, Great Basin, Quandary and Vulcan. The veins are mostly narrow, and rarely surpass a width of two feet. But in the Silver King, 100 feet below the surface an ore-body 4½ feet has been exposed.

The ore in these veins consists principally of galena, containing about 40 ozs. of silver per ton. It contains little quartz and much hydrated oxide of iron, so that a fluid, clean slag may be formed in smelting without addition of much fluxing material. Carbonates of lead are of rarer occurrence and contain only from 15 to 20 ozs. of silver per ton.

Wood in this district costs about $5 per cord, and charcoal 25 cents. Besides Simons' works with two small 10 ton shaft-furnaces which have been finished for some time, there are works being built now by Mr. JACOBS, which, it is said, will contain three round shaft-furnaces ; and Mr. J. E. SCHWARTZ, of Pittsburg, contemplates the erection of a Piltz-furnace, which is to smelt the ores from his own mines principally. These mines are, however, at present hardly sufficiently developed, to encourage hopes for a smelting business of large proportions ; and it is doubtful whether they will be able to supply 25 tons of ore per day for the present and the immediate future.

It is, however, quite certain, that this district will have to show a largely increased product at the end of the year.

New Publications.

The second number of Appleton's *Popular Science Monthly* amply fulfils the high promise of the first. Among the articles of special interest we notice, first, HERBERT SPENCER'S second paper on social science, which is of course forcible and fascinating. Professor YOUMANS himself gives an interesting *resumé* of what is known concerning the sun spots. From *Macmillan's* is republished the lecture of Dr. LIEBREICH on Turner's astigmatism, which has set the art critics of England all a-flutter. Professor QUATREFAGE'S lectures on the Natural History of Man are continued, and begin to seem rather common-place. Dr. B. W. RICHARDSON'S article on the Physiological Position of Alcohol, from the *Popular Science Review*, is a valuable contribution to accurate knowledge on a sadly befogged subject. An account of Sir CHARLES LYELL and the new edition of his *Principles of Geology*, is accompanied with an excellent frontispiece portrait of him. Perhaps the most brilliant article in the number is Darwinism and Divinity, by L. S. This is the paper which, appearing in *Frazer's*, has achieved the unprecedented success of carrying the magazine to a second edition within the month. It is an inquiry into the effects of Darwinism upon creeds, the term Divinity being used in its elder sense of theology. Every article in this number is timely and strong—the cream has been skimmed from the current popular scientific literature of the English language, and brought together in this one pamphlet.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees.

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THE SCIENTIFIC PUBLISHING CO.

WILLIAM VENTZ, SECRETARY.

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THE Annual meeting of the American Institute of Mining Engineers begins this evening at the Rooms of the Geographical Society in the Cooper Union building. In our next number we shall give the first part of our full report of its proceedings. Everything promises an extremely interesting and profitable meeting.

Shaft Accidents.

IN our Mining Summary will be found the account of a terrible accident in the Central mine at Lake Superior, by which ten men lost their lives, one being fatally injured and nine killed outright, while three others miraculously escaped. The *Mining Gazette* thinks nobody to blame but the foolish miners, who will persist in riding on the skip-cars in and out of the mine; and it despairs of ever seeing this practice terminated by any amount of experience of its perilous character. We fully concur with this opinion as to the recklessness of miners; but we hold that the lack of strict rules in mine-discipline is chargeable to Superintendents and Captains also. Moreover, in this case, it seems to us that somebody is to blame for retaining in service a rope that breaks "soon after starting," with the weight of thirteen men.

The New Mining Law.

The Bill "to promote the Development of the Mineral Resources of the United States," having passed both Houses and received the signature of the President, is now a law. We shall publish it in full next week.

The Inconveniences of the Patent Laws.

Last week we referred to the shadow of doubt which has been thrown in England upon the claims of Mr. DANKS, the inventor of the mechanical puddling furnace. It is quite probable that these claims, apart from the new patent which he is said to have obtained, are technically unsound. Certainly we do not think him wise to invite a bitter contest on the question, so long as any amicable solution is possible. If the rumor which has reached us is true, that the iron trade stood ready to raise for him the sum of £50,000 as an acknowledgment of his services, but that he would not accept so small a gratuity, then we think him quite likely to overreach himself. Fifty thousand pounds is a sufficient reward for his labor, and the offer of it, if refused, absolves the English ironmasters from all sentimental or equitable obligations, and leaves the question one of law only. If Mr. DANKS loses everything, he may thank his own unreasonable demands, as well as the obstructions raised by the lawyers, for his overthrow.

The evils in the administration of the patent laws, to which we alluded last week, were then but partially stated. One most troublesome feature deserves to be more fully discussed. It is perhaps a greater nuisance in this country than anywhere else, because the number of patents issued here, and the number of professional "inventors," are so great. We refer to the ease with which patents can be obtained for devices which are new, only because they have never been required before, and which any good mechanic would invent, the moment there was any use for them.

For instance, when wrought-iron columns began to be used in constructions, they were cheaply produced in our rolling mills by combining channel bars, or rolled plates with flanges at the edges, making an angle of 45 deg. with the plates. When these were put together and bolted through the flanges they made a hollow square, or rectangular iron column. On this device nobody ever thought of taking a patent. But after a while, it was desired to make circular columns of wrought iron, and the ironmaster who got the first order for that form "invented" a way to produce it. He rolled a number (say six or more) of channel-bars, flanged at a somewhat different angle from those of the ordinary square pillar, so that when these were set up and bolted together, they formed a sort of cylinder with vertical ribs, instead of a rectangular prism. This approximation could be easily converted by plaster, or other outer additions, into a complete circular column. In both the square and the round columns, all the parts are alike, and can be made by passing them through the same rolls. We venture to say, that any intelligent mechanic, after seeing how the former were made, could have devised the latter immediately. Yet the one who had the luck to do it first had also the cheek to take a patent for his invention; and this patent has been declared valid in court! Nobody can employ this perfectly obvious method without paying royalty to the patentee.

The rolling-mill itself is a pretty old and well-known institution; and the principle of impressing certain forms upon iron ingots by passing them between grooved rolls is not novel; yet every new form of groove that anybody uses, or thinks of using in a roll, is straightway patented; and there are inventors constantly at work conjuring up new patterns in grooves, which they patent, so that they may be entitled to royalty if in the course of time anybody should want to roll those particular forms. Every one of our mechanical industries is mortgaged in this way for many years in advance; the evil grows worse every year, and it is fostered by patent agents with their large stories of enormous profits realized upon these small but essential matters. Already it is a serious question whether our progress is not more hindered by these tormenting embarrassments than helped by the stimulus afforded to invention by the patent laws. We frankly confess that we do not see any better *theory* than that of the patent system for securing to the inventor the reward of his labor, and to the public the fruits of it. We are not prepared to go back to the system of manufacturers' secrets, dying with their first owners, or becoming, on the other hand, worthless to their owners by slipping into publicity. Yet many of our leading manufacturers are ready for this alternative, even. The only means of preserving the benefits of the patent system is, in our opinion, a stricter construction of the law, and a far less liberal answer to the question, What is an invention?

Bethlehem.

During a recent visit to the mines and works of the Lehigh Zinc Company at Bethlehem, Pa., we had occasion to observe many interesting features of this enterprise. The zinc-white and spelter furnaces (on the Belgian plan) are operated with great care and skill. The company keeps a competent chemist making assays and analyses continually, and controls its operations from day to day with great precision. The great New Jersey Zinc Co., by the way, never had any chemist, if we remember rightly the testimony given by its President in a late important suit, to the effect that he had "a better test than any analysis" as to the quality of his product and economy of his process, and that he had use for a chemist perhaps once a year! But we must not be hard on the Jersey Zinc Co., now they are in trouble—a heavy verdict being rendered against them in the case referred to, for the unauthorized use of a patented construction in their reverberatories.

The great pumping engine at the mines was, however, the chief object of attention. We found it working away with ponderous perseverance and perfect regularity and ease, raising with two plungers and two lifts, about 5,000 gallons per minute. Its full capacity, when the pumping part is doubled, will be 15,000 gallons. This engine has already been described in our columns, and an account has already been given of the festivities attending its inauguration. It must suffice now to chronicle simply the fact that it is working to the full satisfaction of its accomplished designer, Mr. JOHN WEST, the mechanical engineer of the Company.

One of the ingenious attachments devised by Mr. WEST, and substantially used both on the great walking-beam engine and also on the Cornish bull engine at the same mines, is a contrivance by means of which, through simple combinations of weights, wires and levers, a piece of plank, floating on the water in the sump at the bottom of the mine, operates a valve in the steam-pipe, and regulates the speed of the engine. The Cornish engine will, when the water is too low to give it a full load, stand still until the water has risen sufficiently for the float to open the steam-valve; and then it commences its stroke. But for this arrangement, the immense pumps might sometimes suck in air. It is beautiful to see how exactly the quantity of water to be raised regulates the speed of pumping, the engines being adequate to all demands, but not overdoing their work.

As to economy, we can only say that the monster with 110 inch cylinder and 10 feet stroke was cutting off at 8 inches when we saw it. Can the force of expansion any further go? Not and raise 5,000 gallons of water 120 feet every minute!

Something New.

WE notice in the columns of DICKER'S *Australian and London Gazette* the reports of the Australian and New Zealand Dividend Gold Mines Investment Company, Limited—a concern with a queer name, and a queer business. It appears that the company owns no mines, but employs its capital through resident and travelling agents in speculating in mining stocks The agent in Melbourne, for instance, reports his investments and their results. In his last report he says: "I have done nothing further in the pur-

chase of shares, and am not in a hurry, for a good many stocks are tumbling down in price. Some of the stocks I last month had indicated an intention of purchasing, had risen considerably in value before I had time to visit them ; and this rise prevented me completing your investments ; but I trust to have the money laid out to advantage by next mail." A company with a shrewd agent, watching to buy good stocks at a bargain, may make a good deal of money in this way, just as an individual may make money in speculating with his own capital ; but we do not see how the company is better off than the individual, unless the mysterious word "Limited" operates in some way to limit the losses of the business. Nobody has started this ingenious plan in the United States—possibly because our people like to do their own investing, and are afraid of "agents."

Inquiry into Boiler Explosions.

WE give elsewhere a letter from Judge Bradley, of the United States Supreme Court to the Secretary of the Treasury, urging the execution by the government of suitable and thorough experiments, to detect the faults in the ordinary construction of boilers, to devise more perfect means of preventing dangerous pressure, and to acquire more certain knowledge of the causes of boiler explosions, upon which penal laws may be intelligently framed and strictly enforced. The application is timely and wise ; and we trust it may be successful.

Appropriations.

The Sundry Civil Expenses Bill, reported to the House of Representatives, May 9, 1872, contains the following appropriations: Hayden's Geological Survey, $75,000 ; Powell's Colorado River Surveys, $20,000 ; War Department, Military and Geographical Surveys (Clarence King?) $75,000 ; mining statistics, $15,000.

About-Town Jottings.

BUSINESS AND PERSONAL.

Personal announcements and business notices inserted in this column, at fifty cents per line.

Root's Wrought Iron Sectional Boiler, manufactured by the Root Steam Engine Co., 500 to 510 Second Avenue, New York.

Geo. F. Blake & Co., 79 Liberty street, Steam Pumps of every size and capacity, for all purposes.

Utica Steam Engine Co. (formerly Wood & Mann Steam Engine Co.,) 42 Cortlandt street, N. Y.

Post & Goddard have removed to No. 111 Liberty street. Dealers in Taps, Dies, Reamers, Drills and supplies generally.

American Submerged Pump. Power attachment—cheapest and best in the market, 55 Chambers street, N. Y.

Roper Caloric or Hot Air Engine, 124 Chambers St.

Blake Bros., New Haven, Conn., manufacture Stone Breaker for crushing ores and minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

The Copper Mines of Chili.

BY JAMES DOUGLAS, QUEBEC.*

As the produce of the Chili mines now regulates the price of copper all over the world, and all speculation as to its future price must depend on the probable future yield of these mines, their condition is a subject of prime importance to all interested in the copper trade. I have, therefore, thought that the following information, derived in great measure from personal observation during a visit made in the latter part of last year to several of the principal mineral districts of Chili, would not be unacceptable to your readers.

All the copper comes, with the exception of but a trifling quantity, from the coast range, and from within 30 miles of the sea ; and nearly two-thirds of it from the three great mineral districts of Tomaya, Carrizal, and Chañaral. From the Cordillera of the Andes little is extracted, partly by reason of the drawbacks to mining at high elevations, where for half the year the mines are closed by snow, and where at all times hard work is impeded by difficulty of breathing, and partly by reason of the heavy freight to the coast. But apart from these obstacles, the copper deposits of the Andes have as a general rule been delusive, offering most tempting surface indications of great wealth, which further operations have not realized ; while the ore is generally contaminated with other metals, whose separation is often difficult, and which depreciate the value of the copper. A small quantity of copper comes from the Cajon de Maïpu in the Cordillera of Santiago, and the Condes Mines in the Condillera of the same province produce 200 tons or so of 23 per cent. ore annually. The only Cordillera mines which augment notably the production of Chili are the Cerro Blanco, which, though situated at the base of the Cordillera, a little south of the Copiopó, prove their relationship to the Cordillera mines by yielding arsenides of copper and silver, and lead ores ; and the Esploradora mines of Mr. Sievert, in the Atacama Desert, 120 miles inland, to the east of Pan de Azucar.

Proceeding from the south northward I shall briefly describe the several mining regions, and the quantities of copper they severally produce.

South of Santiago very little copper is found. A number of small mines are worked both in the Cordillera and in the coast range ; but their total yield falls short of 1,000 tons of fine copper annually. Crossing the line of 33 deg. S. latitude there are upon the same parallel, extending from the coast to the Cordillera, a series of important copper deposits—beds and lodes. It includes the mines on both sides the Melon Valley and the Catemo and San Felipe mines. The metals from the hills bounding the Melon Valley are simple copper ores ; those from the Catemo and San Felipe mines yield a little silver. The San Felipe ores are of grey sulphides ; but as a rule the lodes are narrow. An exception occurs in the Paral mine on one of the Coimas group of lodes, where a lode of a yard wide yields on an average a 30 per cent. ore ; but as the mine is very badly worked, and the stopes are far below the foot of the shaft, twice as many men are employed in pumping as in breaking the ore. The mines throughout this whole district are languishing, and the total amount produced does not exceed 3,000 tons a year. In all probability this yield will not be maintained. Most of the ore is made into regulus and bars at smelting establishments in the Melon and at Catemo. In the San Felipe Valley, Urmeneta and Errasuriz have attempted to use the peat—which is here abundant—for smelting, but as yet without advantage.

Travelling northward through the province of Aconcagua and the southern parts of the province of Coquimbo, one crosses chain after chain of hills, running E. and W., divided from one another by fertile, well-watered valleys. The hills are so saturated with copper that a *desmontes* or refuse heap enters as a conspicuous object into almost every bit of mountain scenery, and innumerable slag heaps in many a nook and corner mark the spots where furnaces smelted the ore from neighboring mines till the hill sides, to the serious detriment of agriculculture, had been denuded of timber. Then mining and smelting together necessarily came to an end, on account of the heavy cost of transporting on mules the poor metals to the coast. Were the Coquimbo Railroad extended through Combarbola to Illapel, this region would again grow into some importance ; but this is an event little likely of accomplishment.

When we reach the river Limari, near Ovalle, we come in sight of the Hill of Tomaya, the most southerly of the great Chili *minerales*. It is an isolated mountain, some 3 to 4 miles long, whose summit is 3,000 feet above the level of the plain, and 4,200 above the sea. Its steep sides, furrowed with deep ravines, rise to a rugged top ; where, from a distance, the rocks seem heaped pile on pile, as if, a stronghold of the Titans, the hill had been overwhelmed and buried by the missiles of an opposing host of giants. A string of white dots, the houses of the several establishments, about two-thirds of the way up, marks the position of the adits driven on the great lode ; and long white streaks reaching far towards its base, the enormous piles of *desmontes*, whose total amount probably exceeds 200,000 tons. As one approaches nearer, the hill looks as if a net had been thrown over it, the cords in their regular reticulations being the roads zig-zagging up the almost perpendicular sides.

There is not a spring of water on the hill, and the mines are so dry that they do not supply the needs of the establishments. The Piké mine alone has expended as much as $600 a month for water. Jigging in the English still hutch is all the water concentration that can be effected.

The *mineral* contains three systems of N. and S. lodes :

(1.) The most easterly lode runs near the eastern base of the hill. It yields very little copper.

(2.) The middle is the great Tomaya lode. It consists of twin veins, with a N. and S. strike and dipping west at an angle of 60 deg. They vary in distance from each other, being sometimes 5 fathoms apart, at others uniting to form large bunches. The eastern lode is left standing because too poor to work ; but the largest stopes are at spots where the E. and W. lodes come together.

(3.) The third system of lodes is on the western slope of the hill. It was in working a mine on this lode that Mr. URMENETA commenced amassing the fortune which the Piké mine has helped to swell ; but the production from here has always been small compared with that derived from the middle lode.

This, the second group referred to above, crops out so near the summit as to form almost the crest of the hill. It runs as a twin lode for from 3 to 4 miles ; but when its outcrop descends the N. and S. slopes of the ridge, it breaks up into a number of stringers, which diverge from the N. and S. course. The lode has not been traced as productive beyond the hill on either side.

It is therefore from this isolated hill that a great proportion of all the Chili copper came from the years 1860 to 1865 : for Carrizal and Chañaral did not produce then what they do now.

The principal mines on the master lode, proceeding from south to north, are :

1. Almagro
2. Pizarro

} Of 400 varas each in length along the strike of the lode. They were both rich at surface, but have fallen off in depth.

3. Piké or Pique of 400 varas. This mine is and always has been the most productive on the hill. It is owned by Don JOSÉ TOMÁS DE URMENETA, whose perseverance in prosecuting the work upon it during years of heavy expenditure and disappointment has been rewarded by raising him to the highest rank among successful miners, and by enabling him to confer vast benefits on his country ; for URMENETA was the first man to introduce into Chili first-rate hauling and mining machinery.

For some fathoms below the outcrop the mine yielded carbonates and other oxidised ores. To these succeeded mixed purple and yellow sulphurets, which, at about the 80-fathom level, gave place to yellow only. This has become more and more mixed with specular iron and carbonate of lime the deeper the workings have been carried, so that the ore has become steadily poorer at the same time that the cost of extraction has increased.

A banded structure is very distinct in the lower levels. From the floor of the lode, there is—

I. A clay selvage.

II. A layer of almost pure specular iron ore.

III. A layer of pure yellow sulphuret.

IV. The rest of the lode consists of yellow sulphuret mixed with quartz, carbonate of lime, and specular iron.

The yield of the lode from wall to wall is from 8 to 10 per cent., and its average size varies from 3

* Republished, with the revision and corrections of the author, from the London *Quarterly Journal of Science*.

to 6 feet, but in places it bulges to vastly greater size. The greatest riches of the Piké were derived from some enormous stopes at about the 60-fathom level, where the lode expanded to over 20 feet in width, and yielded a purple ore, which, as it came from the mine, averaged 30 to 35 per cent. It is supposed URMENETA netted in one year at that time from this mine alone $1,100,000.

The underground works consist of an adit level, run from the western face of the hill, which cuts the lode at about 60 fathoms below its outcrop. All above this level is now abandoned to *piqueneros* or tributers. The ore from below is hauled, by means of a Corliss engine and admirable machinery fitted with friction gearing, through three inclined shafts, which attain a depth of 80 fathoms below the end of the adit; but the lowest level is nearly 60 fathoms below this again. The ore is raised this last 60 fathoms on the backs of *apires* (or carriers) and by hand winches. The lowest level of the mine is therefore about 200 fathoms from surface. The ladder shafts and all the galleries are inconveniently low and narrow. The stopes being very full and the ground insecure, the strain upon the timbering is tremendous, and at every yard you meet pieces bent or broken; and as the habit has been to repair the damage by simply adding others without removing the old ones, the passages have been undergoing a gradual diminution in size. At present little is being done to improve the condition of the mine, as the Lecaros adit is just completed, and henceforth it is intended to draw the metals out by it. This work was commenced as far back as 1840 by Don Ramon Lecaros. It enters the hill on its southern flank, at a spot where the lode was supposed to crop out. It was driven but slowly and irregularly till 1664, when Urmeneta bought the work already done, and continued it more vigorously. It connects with one of the levels of the Piké at about 180 fathoms from surface. This level has been run under the neighboring mine, the Chalaca, so that the total length of the adit is about 1,000 fathoms, nearly half the length of the hill at that level. It is intended to sink a perpendicular shaft from the level of the adit, as the cost of keeping the inclined shaft in repair is found to counterbalance any advantage it offers. As it is expected that the cost of tramming the metals to grass will be much less than the present cost of raising them, it is intended through it to empty the stopes, many of the older of which are filled with 7 per cent. ore, and to break down from the walls large quantities of metal deemed formerly too poor to mine. By drawing on these vast reserves the Piké will be able to keep up its supply for many years to come, even if the percentage of the ore from the workings should fall off. There are now employed in the mine 50 miners, but a larger number of tributers find employment in the upper workings.

Urmeneta is driving another adit from the same slope of the hill, but at a much lower level than the Lecaros. This is, however, being done only to secure certain setts which he owns to the west, on the dip of the lode, in obedience to the Spanish mining law, which requires a certain number of men to be employed on work tending to the development of a claim.

In this mine another hardship of the Spanish mining law in force in Chili is illustrated, though in this instance it redounds to M. Urmeneta's interest. His workings have undermined the neighboring sett on the same lode. It is a small claim of only 200 varas in length by 100 varas in width. M. Urmeneta owns the claim to the west. Now, as the lode dips W. at 60 deg., and the claims do not follow the lode, but are measured perpendicularly downward, M. Urmeneta owns and is working the Chalaca mine in depth from the lower levels of the Piké. Even if he did not own the sett to the W., he might undermine his neighbor, for any one may run into the adjacent mine, if his shaft be the deeper of the two, and break what metal he can, the only reparation to the injured man being one-half of the profits. The reason of these anomalies is that as Government levies an export duty of 5 per cent. on all minerals, the law offers every facility for their acquisition. All mines belong to Government, which gives the first comer a title to them without charge, the only condition being that he work them, otherwise his title drops.

4. Chalaca mine of 200 varas, virtually worked out.
5. Rosario, 6. San José — Both great mines, and deeper than the Piké; both yielded at the same depth purple sulphuret, and both have suffered the same decline in the produce of the ore as we have described in the Piké.
7. Dichosa, 8. Guias, 9. Morculago — The Dichosa once produced largely, but north of it the lode breaks up, and though tributers make profits, very little regular work is done upon the branches.

The total production of these mines is about 1,250 units daily. Of this about half comes from the Piké; and of this half may be said to be extracted from the regular workings below the adit level, and half by tributers from the abandoned stopes, or by ore pickers from the refuse heaps. Half of this yield leaves the hill either hand-picked or jigged to 25 per cent.; the other half will stand at about 12 per cent. The scarcity of water is greatly felt, and occasions heavy loss here as at all the other great mines. M. Urmeneta expects to drain from his adit enough to run a concentrating establishment near its mouth, in which, beside a pair of Huot and Guyler's beautiful piston hutches, there are twenty English hutches to be worked by hand and twenty by steam. He even hopes to run two buddles, but appearances hardly justify the hope.

Every mine has its crushing and concentrating establishment, in which generally a Blake's breaker, and one or more pairs of rolls and sizing sieves prepare the ore for English hutches. At the old Piké establishment Petherick hutches are used, but they do not give satisfaction. At the Rosario, Mr. Lipkin collects the concentrated stuff on the sieve, though the hutch is in other respects like and is worked similarly to the ordinary still hutch. Considering the scarcity of water, I think some form of Rittinger's *Pumpsetze* would answer, if slightly modified by the addition of endless chains to discharge the scimpings and concentrated stuff. All attempts at slime concentration have resulted unsatisfactorily. Krupp steel jackets are in general use for the rolls, and are admitted by all to be in every respect economical. A pair will remain in perfect working order for over a twelvemonth, neither pitting nor wearing unequally.

The *desmontes* are enormous. Those of the Piké are the largest and probably the poorest. They originally yielded from 6 to 7 per cent., but having been picked over four times probably do not now contain over four per cent. Their size may be judged of by the fact that now in their fourth *bouleversement* they are completely overwhelming a good sized village built on one of the shelves of the hill.

The hands employed in this *mineral* in every capacity number about 4000. As all ages and sexes work, this represents a population of about 8000. Urmeneta employs about 600, and as many more work on his property as tributers.

The rate of wages is for common labour 12 dols. a month and rations, worth 15 cents a day. For miners (native) 18 dols. a month, and rations of 15 cents a day. The same high rates aproximately rule throughout all the mining regions of Chili. Cornishmen alone can be trusted with the timbering, and they are even better paid; so that it is evidently a mistake to suppose Chili owes her mining importance to cheapness of labor.

A railroad 36 miles long, connects the mines with the coast at Tongoy. It runs along an almost level plain to Cerillos, at the base of the hill, where, if the shareholders had been wise, they would have made the terminus. Thence it ascends by grades as steep as 5¾ deg., and curves as sharp as 187 feet radius, to the very mouths of the mines.

TO BE CONTINUED.

MINING SUMMARY.

Utah.

DIAMOND CITY, EAST TINTIC MINING DISTRICT, UTAH, May 4, 1872.

TO THE EDITOR:

Sir—I presume your columns are not over-crowed with news from this section of the country, and if acceptable, I would be happy to give you some insight as to how matters progress in this portion of the Territory. Diamond City is situated about 80 miles south of Salt Lake City in the midst of the mountains.

The Camp is finely located, with abundance of good water, wood in any quantity, and mines producing excellent ore. As yet this camp is only in its infancy, but I do not see any place in this or other districts that is keeping pace with it in growth. This district is entirely silver bearing, many of our ores assaying highly. It would take up too much of your valuable space to enumerate the different veins now being worked. I will just glance at a few of the most prominent. The Jefferson is down 100 feet in a rich quartz; the assays from this mine average from $50, to $200 per ton, with a tendency to increase, as it goes down. The Silver Pride, owned by Messrs. Brown, is showing up well; it is now down over 100 feet, and produces good ore from the shaft; a cross cut is being run from the bottom, to tap the main deposit. The Showers is also down 100 feet, and is producing some very fine rich galena. The Nettie, Maggie, and Rio del Norte, are all well developed ledges, containing large quantities of galena, which assays well. The Alice, under the supervision of Mr. James F. Foley, is down 100 feet. It has a large fine streak of galena, encreasing in richness as it is followed down. The hill in which this mine is located, is rich in galena. A drift is now being run from the shaft, which, unquestionably, will strike several veins. A tunnel is being run through the Rising Sun Hill. This is one of the highest mountains in the district, and is well known to be stored with precious metal. Several fine leads have recently been discovered on its summit; but from its great height it is a difficult matter to get at the ore. This obstacle will be overcome by the tunnel which is commenced a considerable distance down the side of the mountain. It is calculated that several important ledges will be struck; and as each one appears it will be developed. It is now in upwards of 60 feet; bed rock has already been found, and from present indications a few feet will open out one of the leads. The Undine is another good lead with a fine vein of ore two feet wide. The owners are buisily developing. The Joe Bowers, owned by a Lake Superior mining company has 3 shafts under way; one is down 109 feet, another 80; both are sunk on a quartz ore assaying well. They are running a cross cut to intersect the main vein, and calculated to strike it within a short distance. The Silver Spar is a very promising lead and from the appearance of what they are now obtaining I should judge the owners are well satisfied with their mine. As a rule the leads in this section run deep before much ore can be obtained, and it is useless for any person to expect fortunes on the top of the ground. That we have good ore in this vicinity is beyond all question; but the great drawback to the full development of our mines has been the want of capital. We have large quantities of ore on the dump waiting for machinery to crush it; and for a company who are well situated with regard to pecuniary means I know of no better field in the territory to operate in. The ore in this district is better adapted for milling than for smelting purposes. The facilities for the erection of mills are excellent; there are numerous springs and fuel ad libitum. Ore has been accumulating here for some time, our miners preferring to hold it until such time they can find a market for it here, as the expense attending the hauling to Salt Lake is more than they are willing to pay. We have an excellent assayer here; and business as a general thing can be transacted without the necessity of a journey to Salt Lake.

R.

Colorado.

BOULDER COUNTY.

Correspondence of the Central City *Register* of April 24, dated Caribou, April 17

Watson, Duncan & Co., are clearing the snow from the shaft on the Eureka, and will soon be sinking on the vein.

The Grand View is 65 feet deep. A rich body of mineral has been struck, and the owners will soon be hoisting valuable ore. Jo. Irwin, Walter Stephens and others have purchased a half interest in the Gray Eagle lode. They are developing it rapidly. It shows a large vein and some rich mineral. The owners of the Seven-thirty

are working day and night shifts. There is no material change in the mine. Large quantities of ore are being raised from a drift, which shows a two foot vein of mineral. Twelve tons of ore have been shipped from this mine since January 1st, and there are now 20 tons on hand.

The latest excitement in mining interests in this district, is the fine showing of the Silver Point lode. This valuable mine is situated on the summit of Idaho Hill, about 400 yards north of town. The owners have also sunk five other shafts 10 feet each on the vein, which shows a large main crevice in the different places where it has been exposed. In the main shaft is a streak of mineral 20 inches wide, and the other shafts look equally as well considering the depth. An assay made at the U. S. Branch Mint at Denver, from second-class ore, gave 1,429 ounces in silver, per ton, valued at $1,847. A quantity has been shipped to Breed & Cutter, who gave its value at 2,028 ounces, silver, per ton; value, $2,636 66. They have six tons of rich mineral on hand, are making preparations to work the mine more extensively, and will soon be raising large quantities of rich ore. The fortunate owners of this valuable mine are S. S. More, A. Livernash, and others. They have obtained a Government title for the property, which was procured without interruption, from the fact that the richness of the mine was unknown by outside parties, until recently. This is undoubtedly one of the first mines in this county, and you can expect to see and hear more of it.

From the Caribou *Post*. At an interview with one of the proprietors of the

CARIBOU MINE,

we were pleased to learn that as depth is gained and the levels extended, there is a wonderful unfolding of the wealth of this celebrated mine. Heretofore magnificent specimens have been seen on exhibition at Territorial and other expositions of the mineral wealth of Colorado, always taking the highest prizes, and exciting surprise both by the size and richness of the specimens, but no ore ever before raised from this mine equals in richness that now obtained in the workings on the west level, just commenced near the bottom of the main shaft,—specimens of which we saw at the office of Messrs. Breed & Cutter. We are told that the ore-vein of rich sulphurets is a foot and a half in thickness, and beside this several feet in width of second-class ores, which are also of a high grade. During the interview we drew out the statement that the workings for the month of March, on one portion of the mine, paid a net profit that would be equal to the interest, at the rate of six per cent. per annum, on thirty million dollars, provided the whole mine had been developed and worked with the same success that the part now open was worked the past month. We also learned that the prospects for this month are even more flattering. The

CARIBOU MILL

at this place is now working sixteen to eighteen tons of ore each day—but has not yet been run to speed, which will soon be increased so as to treat from twenty to twenty-five tons per day according to the kind of ore. A recent important addition to the works is a cupel furnace for refining the bullion which is now produced from 900 to 950 fine. Hereafter shipments of bullion will be made regularly twice a week. The morning we were at the mill 2,200 ounces were sent off by express. The capacity of this mill is likely to be greatly exceeded by the supply of ore from this section the coming season. Some portion of this excess will be shipped east, but more will find its way, as heretofore, to the market always afforded at the works of the Boston & Colorado Smelting Company, at Black Hawk.

SILVER POINT,

on the Idado Hill, is now opened to the depth of sixty feet, and has a wide crevice filled with rich ore. A lot sent as a sample to the Caribou Mill assayed, in silver, at the rate of $2,600 per ton. The owners, Messrs More, Schweder & Livernash, have a large amount of ore on dump awaiting transportation to market so soon as the condition of the roads will permit. The Seven-Thirty, and many other mines are now doing remarkably well.

The new mining camp of

WILLIAMSBURG

is situated five miles north from this place, and within the limits of the Grand Island Mining District, and not in the Pennsylvania District, as heretofore stated. An examination of the record shows that this district extends northward to the summit of the dividing ridge between the North Boulder and the Four-Mile creeks, and so includes the

WASHINGTON MINE,

of Mitchell, Williams & Co., which is now attracting so much attention, and which, if its full development equals the promise of its opening, will, to say the least, prove as valuable as any mineral vein yet discovered in Colorado.

Michigan.

MINING DISASTER IN THE CENTRAL MINE.

From the Portage Lake *Mining Gazette* of May 2d.

But a few months ago we were called upon to record, in the columns of The Gazette, the particulars of one of the most terrible accidents that ever occurred on Lake Superior, caused by a rope breaking which was attached to a "skip car" in a shaft at the Pewabic mine, in which a number of men were at the time in the act of being hauled to the surface. We supposed the results attending this fearful mishap were sufficiently appalling to keep men from running the great risk they do of losing their lives every time they avail themselves of the "skip car" as a means of exit from or entrance to the underground parts of the mine; but it seems as if something more must be done to stop them than furnishing frightful warnings, for it again falls to our lot to give the items attending a precisely similar casualty at the Central mine, Keweenaw County, with this difference, that the number killed in the last instance exceeds the death rate at the time of the Pewabic accident on the 20th of November 1871. Last Monday night about 10 o'clock, thirteen miners employed in the Central mine were descending from the surface to their labor in the "skip car" in No. 2 shaft, when the rope broke just after starting, and the car went crashing through the shaft to the 50 fathom level, killing and mutilating in a shocking manner Thomas Bone, Wm. Barrett, Thomas Berryman, John Berryman, John Ivey, Jacob Garry, Philip Roberts, Thomas Campion, and Edward Thomas. Joel Eade was terribly mangled, and at our latest advices from the mine, was not expected to live. John Roe, J. D. Pearce and Edmund Trevise were not thrown from the car in its descent, and miraculously escaped with a few bruises. Five of the men killed leave families either at the mine or in England. This is the first accident of any magnitude that has occurred at the Central since the mine has been worked, and the gloom it has cast over the community there is described as intense. As we have had occasion to remark before, when speaking of an affair not unlike this, it is useless to charge direct blame to any one connected with the mine on account of the accident. Custom on Lake Superior, notwithstanding the risk and direful results likely to follow riding in "skip cars," has sanctioned the practice among miners and underground employees, and the only way to put a stop to the thing is to procure the passage of a law by the State Legislature, making it a criminal offence on the part of a mining captain or superintendent who will not use all endeavours to prevent men from using the "skip car" for the purpose of going into or leaving the mine.

STRIKE IN THE LAKE SUPERIOR COPPER MINES.

DETROIT May 11.—The Sheriff of Houghton County, Mich., and the Judge of the Circuit Court have telegraphed Gov. Baldwin that 1,500 men, employed in the Hecla, Calumet and Schoolcraft mines are on a strike, and committing outrages against the men who refuse to join them. The property of the companies is threatened with destruction, and the civil authorities are inadequate to preserve the peace. Troops are asked for immediately to quell these disturbances. Gov. Baldwin telegraphed to Gen. Sheridan at Chicago, requesting that two companies of infantry be sent to the mines. Gen. Sheridan, in reply, stated that all the available troops in his command have been sent to the plains. Application was then sent to Gen. Cook, at Detroit, and a company of infantry will leave in the morning for the mines. Information received at *The Free Press* office gives rise to the belief that the disorder will spread to the adjoining counties.

DETROIT May 15.—Despatches received to-night from Houghton, Lake Superior, seem to indicate that the copper miners' strike is about at an end, without any serious results. Part of the men in the Quincy, Schoolcraft, Pewabic and Franklin mines have gone to work on the terms proposed by the mine managers when the strike commenced. The Calumet and Hecla miners are still out, but show a disposition to relent. The troops are expected to arrive on Thursday, which has a quieting influence. The strikers now out are asking that eight hours be taken as the standard for a day's work.

Pennsylvania.

ANOTHER MINING DISASTER IN THE SCRANTON COAL REGION.

[Special Despatch to the Evening Mail.]

SCRANTON, PA., MAY 15.

Another terrible disaster in the mines occurred this morning, involving the loss of at least three lives and the injury of many persons. In the Bellevue shaft, Hyde Park, an explosion of gas occurred at a time when the miners were engaged there in force.

So much excitement prevails in the vicinity that it is impossible to obtain the details of the affair.

According to the best information thus far attainable the explosion was caused, as most of the former ones have been, by incautiously entering a part of the mine where the fire damp was thick, with an ordinary lighted lamp. It seems difficult to impress upon the minds of some of the men who work in the mines the importance of carrying safety lamps only into places of this kind.

The full extent of the disaster is not yet ascertained. It is known that three men were killed outright, and it is feared that more lives were lost.

Five or six men were wounded. Some of them are so badly injured that no hopes are entertained of their recovery.

The excitement is intense. Everybody is running towards the mine and in the midst of great confusion the bodies are being taken out. The frency of one woman on recognizing the body of her dead husband was heart-rending. The friends of the men known to have been in the mine in their efforts to effect a speedy rescue often get in the way and thus retard the attainment of their object. The wounded are being kindly cared for.

LEAD WORKS BURNED.

Pittsburg, Penn., May 12.—The lead works of Fahnestock, Hazlett & Schwartz, on Liberty-st., took fire this afternoon, and were entirely destroyed, together with the dwelling adjoing. Fahnestock, Hazlett & Schwartz's loss is very large, probably $500,000; insured for $60,000—$5,000 in each of the following companies; North American of Philadelphia, Hartford of Hartford, International of New York, Delaware Mutual of Philadelphia, Union of Bangor, Me, and the balance in Pittsburg companies.

California.

We copy the following budget of mining items from the *Scientific Press* of May 4.

ALPINE COUNTY.

Started Up.—Alpine *Chronicle*, April 20: Two amalgamaters for the Tarshish Mill arrived on Wednesday's stage, and on Thursday the mill and furnaces were started up.

Pioneer Mill.—This mill, at Markleville, is to be removed to Hope Valley, where it will be erected for the use of the Barnes' mine.

AMADOR COUNTY.

Specimen.—Jackson *Dispatch*, April 27: A Co., who have been engaged in working a placer claim on the south fork of Jackson Creek, were rewarded, last Friday, by finding a piece of quartz weighing a little over 8 lbs, and valued at from $500 to $1,000.

CALAVERAS COUNTY.

Seifferd's Claim.—San Andreas *Citizen*, April 27: Mr. Seifferd is taking out ore preparatory to having it crushed at Lloyd's mill.

Capitol.—This Co. are down 35 or 40 ft. They have a well defined vein, which widens as they go down.

ELDORADO COUNTY.

Placerville *Democrat*, April 27: The Pocahontos Co. at Logton, have struck a richer deposit than ever before found in the mine.

LOS ANGELES COUNTY.

San Gabriel.—Los Angeles *News*, April 20: The Roberts Co. is the only one at present working, being engaged in hydraulicing a bank at least 500 ft above the level of the river. Four men are at work prospecting new ground. The first clean-up was $300 from an 8 day's run.

The Ferguson Co. have 15 men cutting their ditch, 2 miles of it being already completed. There still remains another two miles unfinished. Kaley & Co. are also engaged in ditch-making. The Patterson & Hawley claim is in the bed of the river, where preparations are going on to commence sinking.

NEVADA COUNTY.

Dead Man's Flat.—Nevada *Transcript* April 23: The shaft on Hunt & Talbot's ground is being timbered and pumped out, and will soon be in working order again.

The Constitution claims tunnel work will soon be commenced.

Idaho Mine.—There is enough ore in sight for 3 years' work, and the mine is paying better than at any time since it was opened.

Locations.—Sisson, Wallace & Co. have located all the waters of Martis' Creek and its tributaries.

F. E. Baker and others have located 1,500 ft of mining ground, at Blue Tent, Nevada Township.

Buchanan.—The mine is on Big Deer Creek, about 3

miles east of this city. The tunnel is in 300 ft, and the ledge is opened to the depth of 100 ft. It is about 20 inches wide, and the rock pays steadily from $25 to $30 per ton.

Sweetland.—The Sweetland Creek G. M. Co are employing 45 men night and day, and using 750 inches of water. They clean up every 6 weeks an average of $30,000. The Greek claims owned by the same Co., clean up from $2,500 to 3,000 at every run of 6 weeks.

The Buckeye Co. are running a tunnel 2,200 ft in length to reach the bottom gravel, 900 ft being completed, and expect to have it finished by next fall.

The Manzanita Co. are running off top dirt, which is paying well. They are also engaged in running a tunnel to reach the pay gravel.

The American Co., on Manzanita Hill, are running night and day, and using about 1,100 inches of water. They clean up every 2 or 3 weeks from $9,000 to 12,000. This Co. is also running a tunnel to get in lower to reach the gravel.

Banks, Dennigen & Co., on the same Hill, are taking out considerable gold.

The Yuba Co. have just started in with very bright prospects.

Relief Hill.—nearly all the Co's. are at work. The Eagle Co. is engaged in drifting, working 8 men, and clean up every 30 days. The last run they made yielded them at the rate of $47 to the hand, or in the aggregate over $11 000 for the 30 days' run. The Waukeshaw Co. are progressing finely in their hydraulic claim. The Union and Eureka Co's are working a large number of men, and their prospects of large clean-ups are good.

Bricks.—Grass Valley *Union*, April 23: At Findley's place last evening might have been seen 2 gold bricks from the Idaho mine, valued at $15,000, out of a 15 stamp mill, run for 2 weeks.

Rich Strike.—The steam machinery of the Knight of Malta has been in operation for several days, and Thursday night the water was taken out of the shaft. Yesterday morning the miners in sinking on the ledge found the most beautiful rock, filled with free gold and sulphurets. The ledge has fine walls and is from 2 to 3 ft thick in the shaft.

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the Organ of the* AMERICAN INSTITUTE OF MINING ENGINEERS, *and is regularly received and read* BY ALL THE MEMBERS AND ASSOCIATES *of that large and powerful society,* THE ONLY ONE OF THE KIND IN THIS COUNTRY. *It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country, and presents the very best means of reaching that very important class of men.*

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The rates of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

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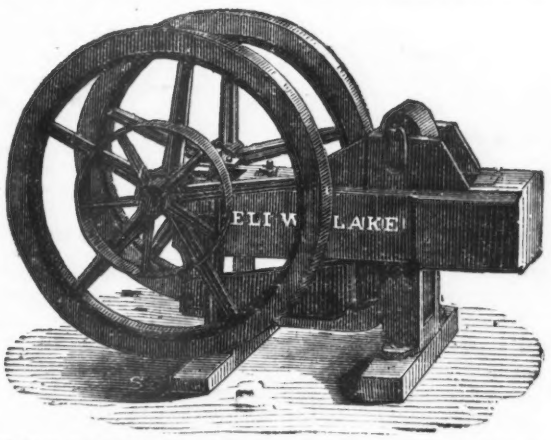
Nov. 21:1y

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

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May 17:1y

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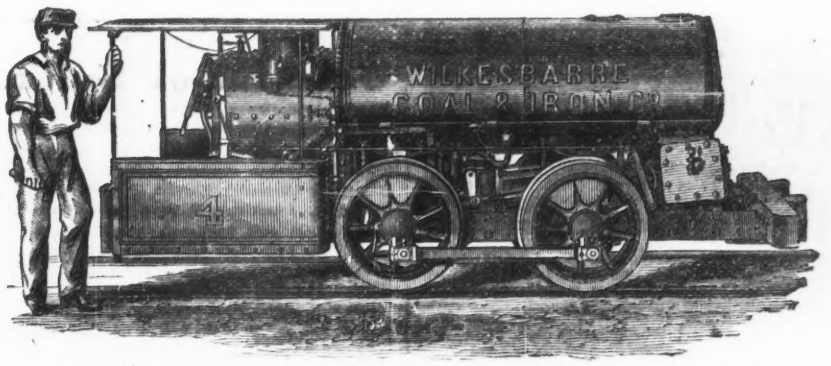
Jun28:1y **SPIEGELEISEN CINDER FOR BLAST FURNACES.**



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Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives.

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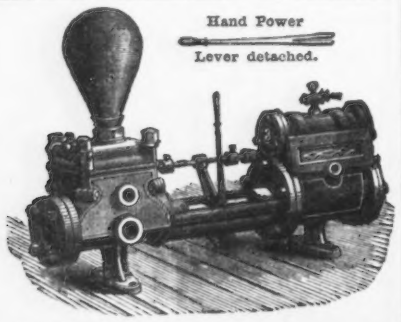

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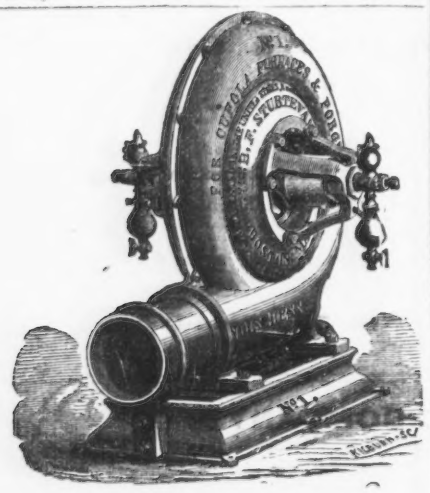

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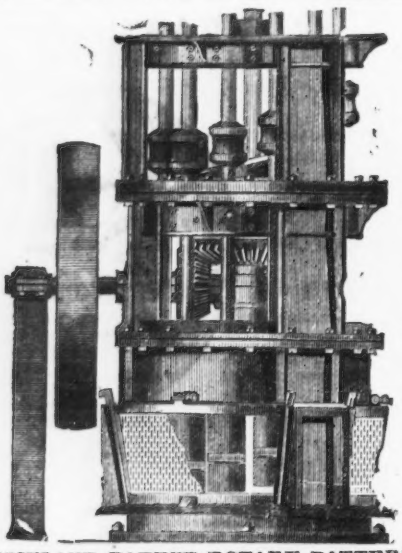

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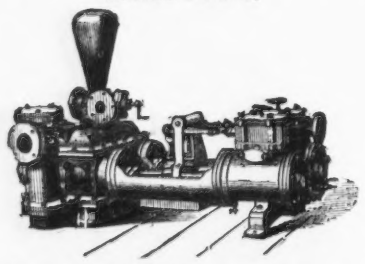

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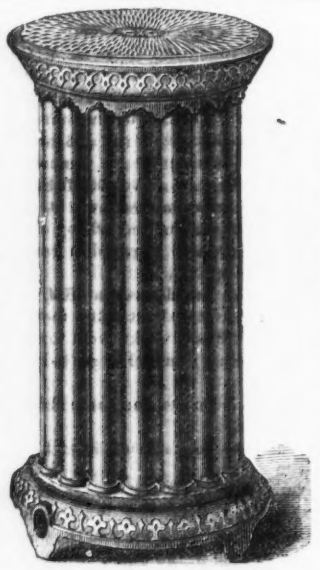

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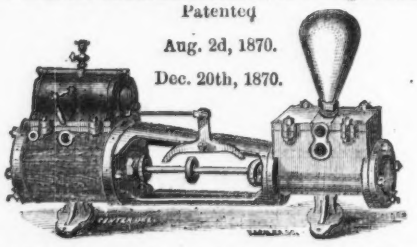

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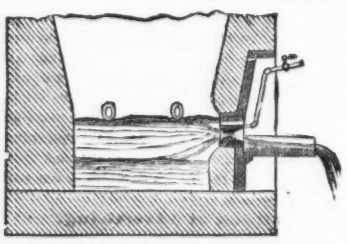

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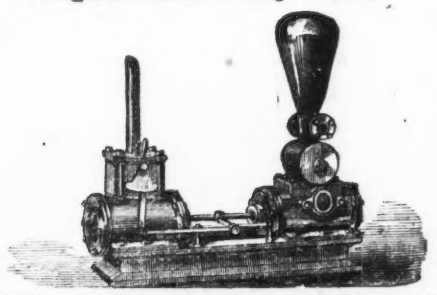

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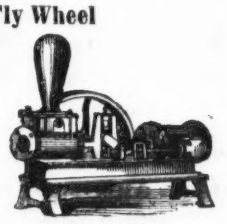

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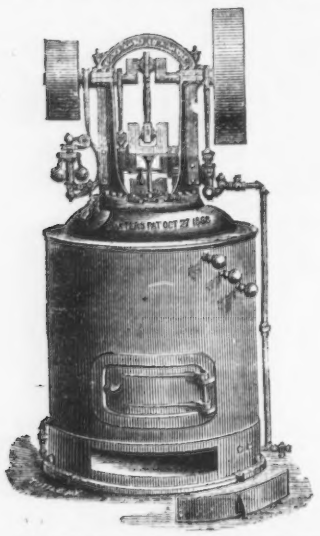

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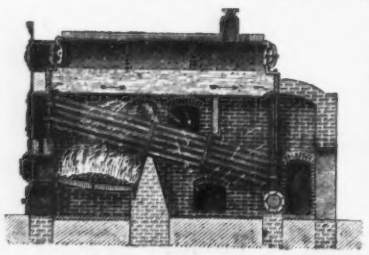

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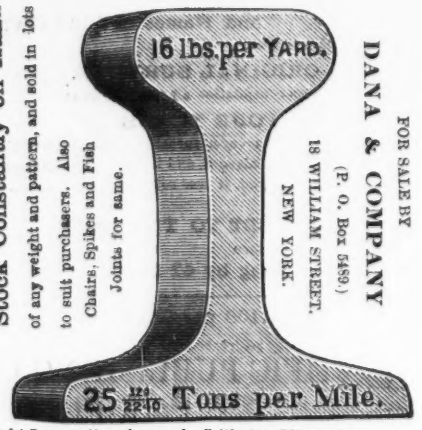

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